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## THE SIGNIFICANCE OF THE TUBERCULIN REACTION AND OTHER PROBLEMS IN OCULAR TUBERCULOSIS.

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ST. LOUIS, MISSOURI.

This paper gives some history of early experience regarding tuberculin reaction. The observations of the writer and his colleagues as to nasal and sinus lesions associated with ocular tuberculosis are summarized. The substance of replies to a questionnaire by representative pathologists and bacteriologists is given. These deal with the diagnostic importance of the tuberculin reaction, especially the focal reaction to minute doses; and whether such focal reactions have been observed from the injection of nonspecific substances. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, July, 1922.

Anyone whose experience is as limited as my own, may well hesitate to present a discussion of problems related to ocular tuberculosis, before a society where every member thru daily professional contact with this class of cases qualifies as an expert. And yet, to what better place might a tenderfoot come with the doubts and queries concerning the use of tuberculin for a diagnostic or therapeutic purpose?

Tuberculin reactions are of three types: (a) General or constitutional. (b) Dermal or local at the point of injection or vaccination. (c) Focal, the special reaction at the site of the lesion in the tissue. Discussion of the significance of the tuberculin reaction in ophthalmology is practically limited to the consideration of the focal ocular reactions as a diagnostic test and the therapeutic effect of repeated injections. The questions arising in the diagnosis and treatment of ocular tuberculosis can not be solved without due regard for the problems of general tuberculosis. These were very clearly indicated in a comparative way by Dr. Leo Loeb, of St. Louis, in an address on cancer before the St. Louis Academy of Science, Nov. 1921. He referred to the striking difference between tuberculosis and cancer, the tuberculous infection being characterized by cell necrosis, while cancer cells tend to unlimited growth and proliferation. He then added:

"As late as ten years ago, the majority of physicians would probably

have answered this question by stating that the causes of cancer are unknown to us; that the causes of tuberculosis and other infectious diseases, on the other hand, have been fully determined. Today it would come nearer the truth if we would acknowledge that *while the external cause of tuberculosis is known, much has still to be learned about the cause of tuberculosis*. That the external factor does not constitute the only cause of tuberculosis; that many individuals are infected by the bacillus, but that the result differs very much in different cases. What part does the character and constitution of the exposed or invaded organism play in this infection? Does heredity play any part? Is the shape of the thorax, the condition of the lymphatic apparatus, of the circulatory organs of importance in determining the character of this disease? Does it assume an especially virulent course in certain populations, because they lack an acquired or perhaps inherited immunity? How does the toxin of the tubercle bacillus produce its specific effect on the organism? There are, then, multiple causes of tuberculosis and the analysis of the inner causes of tuberculosis still remains a large field for further investigation."

In a similar manner a critical survey by any one of us of his experiences with ocular tuberculosis in the last twenty years will furnish ample ma-

terial for study. The writer, therefore, will assume the privilege of attempting such a resumé based on his own observations and practice.

During the writer's first four years in ophthalmology, as an apprentice assistant in a busy private practice in St. Louis, the diagnosis of ocular tuberculosis was rarely suggested. Ocular disease of vague etiology was treated with mercury and iodid and not infrequently with excellent results. When he entered the University Eye Clinic at Kiel, Germany, as Volunteer Assistant in 1904, Professor Voelckers in referring to this class of cases said, "who knows, even if they are tuberculous and not syphilitic, it may be that a little mercury in the circulation will inhibit the activity of the tubercle bacillus." The following year it was his privilege to attend the Heidelberg Congress of Ophthalmology, at which A. von Hippel, Sr., presented a paper on "Additional Experiences in the Treatment of Severe Ocular Tuberculosis with Tuberculin (T. R.)." This report showed marked clinical improvement in a class of cases in which treatment had been generally unsatisfactory and diagnosis doubtful. It was accorded favorable discussion by Sattler, Halben, Uthoff, Czermak, Haab, and Purtscher, in a manner sufficient to persuade even the most skeptical. It is interesting to note that von Hippel relied on a positive constitutional reaction to make the diagnosis of ocular tuberculosis. Only Czermak in discussion referred to the focal ocular reaction, as a prerequisite before beginning treatment of ocular disease with injections of tuberculin. Uthoff referred to the absence of any actual focal reaction in the eye in his cases. Today, perhaps, no oculist would hazard a positive diagnosis of ocular tuberculosis after a test injection unless a focal reaction occurred. We know, from the experimental work of Stock and from numerous case reports, that the tubercle bacillus may produce types of ocular inflammation which lack distinguishing characteristics. Hence, the importance proper-

ly attributed to the focal reaction.

It is interesting also to compare the *dosage* of that period and the present. Von Hippel invariably began with one milligram of old tuberculin as a test injection. He used tuberculin R. for therapeutic effect, in increasing doses from 0.002 mgr. to 1 mgr. given at intervals of two or three days. He states that he did not find it "necessary" to increase the dose above 1 mgr.; but Sattler reported giving as much as 5 mgr. of the dry tuberculin and Halben reached the dose of 5.5 mgr. of tuberculin R. (subcutaneous) in the case of a girl fifteen years of age, during a course of treatment of four months duration for nodular keratitis. Such doses bear about the same relation to the approved dosage of today that a whole wagonload of full sized loaves does to a single slice of bread.

Our practice at this time is to begin with a test injection of 0.0002 mgr. of old tuberculin. Under very close observation that dose may be sufficient to permit the detection of a focal ocular reaction; which may consist of an increase of infiltration or exudate or fresh hemorrhage in or about the lesion. We have rarely found it desirable to increase the test injection beyond 1/200 mgr. of old tuberculin, and usually do not exceed this dose in therapeutic injections regardless of the kind of tuberculin used.

Returning to Kiel after the Congress, the writer observed that Stargardt's attempts to carry out von Hippel's suggestions, in the diagnosis and treatment of ocular tuberculosis, were followed by excellent results. Upon return to St. Louis in the summer of 1906, the first two cases which called for treatment along these lines occurred in the practice of my preceptor, the late Dr. John Green. One was a case of nodular keratitis in a young lad who had been subject to several attacks of pleurisy. His home was in Arkansas. Previous consultations with oculists in that state were reported as resulting in the advice to enucleate the affected eye on account of the hope-



less loss of vision and suffering and to avoid extension of the tuberculous inflammation from the eye to the brain. This advice was strictly in accord with certain classical contributions to ophthalmic literature. After several months of treatment with injections of tuberculin, this boy was sent home free from discomfort and with reading vision in the affected eye.

The second case was that of a young woman from northern Missouri, who had suffered from repeated attacks of what appeared to have been phlyctenular keratitis, in the left eye. The right or hitherto sound eye presented a sclerosing keratitis at the temporal limbus, of very recent origin. Both parents had died of tuberculosis, but a diagnosis of syphilis had been made on general principles and was adhered to by energetic treatment with mercury and iodids, until the sclerosing infiltration had covered practically the entire cornea, causing a failure of vision from 16/15 to mere recognition of hand movements at three feet. The pain and suffering meanwhile had become so intense that morphin was used to secure rest at night. Test injection of tuberculin was followed by both a focal and constitutional reaction. The therapeutic injections of tuberculin brought prompt and complete relief from pain, with considerable improvement in vision. However, deep diffuse permanent scars remained in the cornea in a manner typical of tuberculous keratitis, and rather distinguishing it from the interstitial keratitis of hereditary lues. Following the somewhat sensational benefits of tuberculin treatment in these two cases, it was desirable to institute the treatment in other similar conditions and its use to date has shown the same degree of success currently reported in ophthalmic literature.

The first case to upset regular order was one of typical nodular keratitis in one eye in a boy, aged sixteen, which appeared shortly after exposure to cold and wet during the winter season. The focal ocular reaction was strongly positive, but instead of the beneficial

effect which usually followed the initial irritation and excitation of the ocular lesion, this eye continued to get worse. An interview with the father concerning the boy's health revealed the fact that the father was a syphilitic, who thought he had been cured by three years of treatment before marriage. The use of active antiluetic treatment, in connection with tuberculin injections, resulted in the recovery of perfect vision and a marked improvement of the general health. Thereafter, whenever a double infection by syphilis and tuberculosis was suspected, effective treatment for the cure of syphilis was instituted first of all. It was found that then the tuberculin injections produced the typical reactions with therapeutic benefit. Thus, clinically, a nonspecific element in individual resistance to tuberculosis had to be recognized.

Another problem related to ocular tuberculosis was presented by the fact that in private practice, and in eye clinics thruout the world, an astonishingly large number of cases of ocular tuberculosis were reported in which pulmonary or constitutional evidence of the disease was conspicuously absent. In contradistinction to these observations, it was found that ocular complications were by no means constantly present in cases of pulmonary tuberculosis. Fleischer tried to explain the first group of cases by assuming that the bronchial glands were the source of the ocular infection, in the absence of all clinical evidence of an active tuberculous inflammation in the lungs. This seemed rather a remote source of infection, especially as these ocular manifestations were not accompanied by symptoms of disease in other organs, such as might be anticipated if bacilli were carried in the blood stream. Must we assume that ocular tuberculosis is always a hematogenous infection, or can we find a more direct approach by which the tubercle bacillus or its toxic products can be conveyed to the ocular tissue?

In 1915 it was the writer's privilege to report to this Congress the first case

in which an evanescent but definite nasal focal reaction was observed, after a test injection of tuberculin simultaneously with an ocular focal reaction on the same side. Dr. Greenfield Sluder made this observation quite unexpectedly. Most careful examination of this patient's lungs and other organs by Dr. Louis Warfield gave negative results, even after repeated test injections of old tuberculin. The ocular lesion was cured and vision much improved following tuberculin therapy.

For further study in that connection some of the ablest rhinologists in St. Louis have, at my request, made repeated observations on the nose and throat of patients, both before and after the use of subcutaneous test injections of tuberculin in cases of suspected ocular tuberculosis; and in more than three-fourths of the cases a focal reaction in the nasal mucosa, or in the accessory nasal sinuses, has been reported coincident with the ocular focal reaction. These observations obliged consideration for the possibility of ocular disease being due to the tubercle bacillus, or its toxic products, carried to the eye by lymph currents from the nasal mucosa. The possibility cannot be denied. The probability may be argued from both anatomic and clinical data. It is practically impossible, however, to obtain the actual proof.

The upper air passages constitute a sieve, straining the air both at inspiration and expiration. It is conceivable therefore that the bacilli may be arrested in the upper air passages before they reach the lungs and bronchi. Also, they may lodge there as they are being expelled by coughing from an open pulmonary lesion. From the shorter duration and greater force of expiration, especially when accompanied by coughing, it appears more likely that the bacilli would be deposited in the nose and throat during inspiration. This may afford an explanation why persons *not* suffering from pulmonary tuberculosis *but inhaling bacilli* occasionally develop ocular tuberculosis; while those who have active pulmonary disease show relatively

little involvement of either the upper air passages or the ocular tissues.

We have had at least three cases in which it was possible to trace the occurrence of ocular tuberculosis to recent exposure by contact with individuals suffering from active pulmonary disease. The first was a housewife of middle age, exceptionally well nourished, showing no evidence of constitutional disease upon careful examination, where a chronic uveitis developed in one eye, immediately following a period of some weeks during which she gave more than mere neighborly attention to one of her friends fatally ill with pulmonary tuberculosis. In her case a focal reaction occurred in that eye and in the sphenoidal sinus on the same side. The second was a school teacher with special training in physical culture, whose general health was excellent. She developed an episcleritis in one eye, which gave a definite focal reaction and recovered promptly and completely under therapeutic tuberculin injections. A month before the attack she had visited a friend, whom she found to be suffering from pulmonary tuberculosis, tho kept in ignorance of it. Rather than arouse her friend's suspicion by a refusal, she had shared her room and bed for two weeks. The third was a little girl seen at the clinic and treated for acute conjunctivitis with recovery. Several months later she returned, having developed a severe iridocyclitis and keratitis. It was found that she had been visiting an aunt, whose husband was dying with pulmonary tuberculosis. In this case, also, an indisputable focal reaction was observed in the nasal mucosa on the same side as the affected eye. The ocular condition recovered perfectly under continued treatment with tuberculin injections.

Further proof of the close relation between conditions in the nose and throat and ocular inflammations recognizable as of tuberculous origin, may be found in the direct benefits to the ocular disease obtained by the operative correction of the nasopharyngeal

conditions. In 1915 I reported two such cases in detail at the Colorado Ophthalmological Congress, in which operation on the sphenoidal and postethmoidal sinuses by Dr. Greenfield Sluder resulted in the arrest and apparent cure of the ocular inflammation. The subsequent history is that both of these cases relapsed following influenza. In one of them hyperplasia in the sphenoidal region required further operation. In both of them, tonsillectomy was followed by marked improvement in the ocular condition. In fact, no severe ocular inflammation has been noted in either case since the tonsillectomy.

A third case, likewise mentioned in my report to this Congress in 1915, as having shown both ocular and nasal focal reaction with apparent cure by continued hypodermic injections of tuberculin, had an acute attack of choroiditis with exudate in the vitreous and precipitates on Descemet's membrane in the same left eye, four years later. In this patient there was typical tubercle formation in the choroid, one or more of these tubercles being freshly developed at each attack. Examination of the nasopharynx showed infected tonsils and adenoids, with mucopurulent secretion from the left posterior ethmoidal sinus and possibly from the left sphenoid. The prompt arrest and cicatrization of the tubercles in the choroid and the absorption of and precipitates on Descemet's membrane and of the exudate in the vitreous followed immediately after the tonsillectomy, without the use of the tuberculin or any other treatment. In this case rhinologic examination had shown a marked deviation of the septum toward the left side, blocking the postethmoidal and sphenoidal region. But a septum operation had been postponed, because it was hoped that with the development and growth of the facial structures the deviation might be spontaneously corrected. Three months later, after an acute coryza, a third attack occurred in the left eye, showing the same type of inflammation, and a submucous resection was

done. Since the correction of the septal deformity and the establishment of free drainage from the postethmoidal and sphenoidal sinuses on the affected side, there has been an apparently permanent cure, with vision restored to 16/10 in the affected eye.

Clinical experiences similar to these were duplicated often enough to prove, beyond question, the direct curative effect obtained by the proper treatment and surgical eradication of foci of infection in the nose and throat, upon what appeared to be ocular tuberculosis. This included tonsillectomy and adenectomy when indicated, and the correction of nasal deformities to provide proper drainage from infected paranasal sinuses, as well as the appropriate medical treatment of the nasopharynx. In our search for foci of infection to be eliminated we have, of course, not neglected dental infections. By beginning our treatment with the radical removal of all focal infections, we have often arrested and apparently cured ocular diseases of those types in which we formerly secured focal reactions to tuberculin. As a result we have used tuberculin less and less as a diagnostic or therapeutic agent during the last five years. Does the focal, nasal or ocular reaction following test injections of tuberculin furnish actual proof of the tuberculous character of the ocular or nasopharyngeal disease? There are three possible explanations.

1. The nasopharyngeal disease may be the active focus of tuberculous infection, which causes the ocular disease by diffusion of toxins. Collins and Mayou report that the actual tuberculous lesion may not be situated in the ocular tissues in which the symptoms appear, the latter process being caused by toxins diffused by the former. May we not assume the possibility of a similar relation between active tuberculous disease in the nasopharynx and the eye? Then both the eye and the nasopharynx might show a focal reaction after tuberculin tests; and the surgical removal of the source of these toxins might be expected to cure the ocular disease.

2. It may be assumed that ocular tuberculosis is always of hematogenous origin and that these nasopharyngeal lesions have nothing to do with the etiology of ocular tuberculosis, except that the presence of localized infection in the tonsils, paranasal sinuses, etc., may lower the resistance of ocular tissues to tuberculous infection. The benefit known to follow the removal of these infections could then be explained by improved resistance. Stock's experimental production of ocular tuberculosis in rabbits, by the injection of bacilli into the blood stream, has been fully confirmed by Finnoff's recent experiments. But neither series furnishes proof that the bacilli can only reach the ocular tissues by the blood stream. That they may be so introduced must be conceded. When certain well known clinical phenomena are considered, the direct transmission from the nasal mucosa to the ocular tissues thru lymphatic channels seems to be more likely. We must not lose sight of the fact, that the first manifestation of tuberculosis in childhood is often found in the lymphatic glands of the neck. Similarly the earliest evidence of pulmonary infection by the tubercle bacillus may be the roentgenologic demonstration of infected bronchial glands. Pathologists tell us that the tubercle bacillus may pass thru mucous membranes without any demonstrable local lesion. There are numerous anastomoses between the vascular supply of the nasal mucosa and that of the orbital and ocular tissues; but there are no lymphatic glands to shield the ocular tissues from the toxic substances, or bacilli, which may be carried by these perivascular lymphatic currents. For that reason the ocular tissues are singularly more exposed to infection thru lymphatic channels, than other parts of the body where lymphatic glands intervene to form the first line of defense. On the other hand, when tubercle bacilli are free in the blood, the human body is just as likely to succumb with symptoms of general miliary tuberculosis, as were the rab-

bbits in the series reported by both experimenters. However, that is not the clinical picture in most cases of ocular tuberculosis.

3. We may assume that neither the focal reaction in the eye nor in the nasopharynx is due to tuberculosis. That is, we may deny that the focal reactions to test injections of tuberculin have any diagnostic significance.

The histologic examinations of nasal tissues removed in some of the cases have failed to show positive tuberculosis—either tubercle formation or bacilli. Granulation tissue and a few giant cells were the most suggestive observations. The failure to find typical tubercle formation in ocular lesions supposedly due to tuberculosis has aroused considerable discussion from time to time. Stock states that he presented eyes showing lesions which followed the experimental inoculation of rabbits with active tubercle bacilli, to a number of pathologists, who were thoroly familiar with the histologic appearance of the tuberculous process in the tissue of rabbits as well as in human beings. They refused even to consider tuberculosis as the cause of these ocular lesions until he demonstrated the presence of bacilli. He asks why should we not have similar atypical appearances in the ocular tissues of human beings. He concludes that as long as the atypical appearance did not preclude the actual presence of tubercle bacilli, which may be sparingly present and difficult to demonstrate, then this atypical appearance is insufficient evidence upon which to base a denial, that tuberculosis is the actual etiologic factor in those cases where a tuberculin reaction has demonstrated the presence of foci somewhere within the body.

In May, 1921, the writer presented a review of ophthalmic literature and personal experiences with reference to ocular tuberculosis before the Trudeau Society of St. Louis, an organization of internists, pathologists, and bacteriologists devoted to the special study of tuberculosis. In the discussion two criticisms were presented; one by an



ophthalmologist who said he had seen no such cases of ocular tuberculosis, but admitted that he never used tuberculin either as a test or as a therapeutic measure, the other by a pathologist who stated that a focal ocular reaction to tuberculin was not sufficiently specific to be of diagnostic value. The first criticism could easily be met with the statement that if no test were made, it was not surprising that cases of ocular tuberculosis were passed without recognition, but the second criticism could not be lightly forgotten. Obviously, the stricter tests demanded by pathologists and bacteriologists for the absolute proof of the presence of an infection can not be supplied in the majority of these cases. We can not excise ocular tissues and jeopardize vision—to satisfy even a wholesome scientific curiosity with the demonstration of the bacilli in the tissues, or the inoculation into animals for the reproduction of the disease. The preponderance of clinical evidence, the successful treatment of these cases as clearly shown thruout ophthalmic literature for the last fifteen years, is too firm a foundation to be cast quickly aside because clinical reports can not be accepted as final evidence in the laboratory. But such a question invites, yes demands, an attempt at the coordination of the facts looking toward an acceptable basis for cooperation between medical art and science.

After consultation with Dr. M. S. Fleischer, Director of the Department of Bacteriology, St. Louis University School of Medicine, a questionnaire was sent to certain representative pathologists and bacteriologists to determine, first of all, whether the focal reaction of tuberculin was generally regarded today as having specific diagnostic importance. We tried to reach those who might be able to answer on the basis of personal experience and who could speak with authority on this subject.

Seventeen noncommittal replies were received, usually based on lack of experience by which their general knowledge of tuberculosis might be applied

to the special problems of ocular tuberculosis.

For example, Dr. William H. Park, Bureau of Laboratories, Department of Health, City of New York, wrote, "I have had practically no experience in the diagnosis of ocular tuberculosis, and as you want facts and not opinions, I will not try to answer your questions;" Dr. E. C. Rosenow wrote, "I am sorry not to be able to express a reliable opinion on the points covered in your questionnaire, because I am not actively engaged in this type of work." Dr. Simon Flexner, Dr. H. G. Wells, and Dr. Jos. McFarland were among those who replied but preferred not to record definite answers. We may at least infer from this attitude of such eminent authorities that these questions have not been finally settled.

In answer to the first question, "Do you regard a focal reaction following the injection of tuberculin as a specific reaction from the immunologic viewpoint?" nine directly positive replies were received. The following replied positively with reservations: Dr. John Albert Kolmer, Director of Laboratories, Dept. of Pathology and Bacteriology, Graduate School of Medicine, University of Pa., answered, "*Yes, in doses of less than 10 mgr.*" Reference in detail should be made later to a valuable resumé by Dr. Kolmer, of investigations pertaining to this subject, read before the Philadelphia County Medical Society, March 8, 1922. Dr. Allan C. Woods, to whom Dr. W. G. McCallum, Johns Hopkins University referred the questionnaire for answer, writes "probably yes" in answer to the first question. Dr. E. G. Schorer, Kansas City, Mo., replied, "yes, as specific as any focal tuberculin reaction." Dr. F. M. Huntoon, H. K. Mulford Co. Laboratories, Glenolden, Pa., writes, "It is a specific irritative reaction, but not immunologic in its nature." Dr. W. J. Neal, New York City, writes, "Usually specific and of great diagnostic weight, but not absolute. For critical proof demonstration of bacilli may be justly demanded." Dr. W. H. Manwaring, Stan-

ford University, California, writes, "The focal reaction in tuberculous tissue is generally regarded by immunologists as a specific antibody reaction. We know practically nothing, however, concerning the fundamental nature of immunity in tuberculosis, particularly in reference to the changes in the fixed tissues. It is possible that the focal reaction may depend in part at least upon nonspecific factors, not at present taken into consideration. I believe a very careful study of the specificity of the reaction in experimental animals would be of fundamental value."

Two answers expressing doubt were received; one from Dr. Arthur F. Coca, New York, who writes, "This question is a little uncertain on account of Krause's observation, (J. Med. Res. 1916, xxxv, pp. 1, 25, 43), that animals infected with timothy bacillus react to extract of tubercle bacilli." The other from Dr. Leo Loeb, Washington University Medical School, St. Louis, who writes that he cannot speak from personal experience, and that detailed references to literature on this subject are temporarily impossible as he is away from St. Louis.

One negative answer to this question was received from Dr. W. F. Petersen, Dept. of Pathology and Bacteriology, University of Illinois, College of Medicine, Chicago. He adds the following footnote, "I am taking the liberty of sending to you two reprints which cover my ideas on this particular subject. From the immunologic point of view there is no doubt in my mind that the reaction is not a specific one; but like the Wassermann reaction, while not specific, it is clinically useful and if the modifications (both inhibitory and accelerating) are taken into consideration, then the reaction (when small doses are used) is for clinical purposes specific."

Dr. Petersen's personal research work on this subject challenges the most respectful attention for his answer. The two comprehensive papers by Dr. Petersen—the first on "Factors in Resistance to Tuberculosis," published in the Archives of Internal Medicine, Jan., 1918, and the second on "The Focal Reaction," published in the American Re-

view of Tuberculosis, May, 1921, are worthy of a detailed consideration quite beyond the proper limits of this paper. Certain salient points demand attention, after discussion of the remaining answers to our questionnaire.

Question No. 2 was, "Do you consider it possible to establish the diagnosis of intraocular tuberculosis by a focal reaction in response to the injection of a minute quantity of tuberculin?"

As might be expected, the majority of pathologists hesitated to give any answer for want of special experience. A total of 25 letters were noncommittal on this question, six were direct affirmations, three were conditional affirmations and two may be regarded as negative.

Dr. W. F. Petersen, writes, "Yes, if factors that modify the reaction are taken into consideration." Dr. A. C. Woods writes that it is not possible to "establish" the diagnosis by a focal reaction, but that it is possible to "confirm" a clinical diagnosis "where all other etiologic factors have, in so far as possible, been excluded by previous study." Presumably this requirement has always been met by any ophthalmologist before he would resort to the use of tuberculin. Dr. W. J. McNeal writes, "Yes, in the sense of a *probable* diagnosis. Again, scientific accuracy may demand demonstration of bacilli or production of tuberculosis by inoculation in animals." Dr. A. B. Wadsworth, Director of Laboratories and Research, Dept. of Health, State of New York, writes, "The answer to your second question depends upon how carefully the dosage of tuberculin is gauged. The practical value of tuberculin, of course, depends upon careful standardization of the activity of the particular tuberculin that is used. I have always favored the subcutaneous injection as the most reliable method from the standpoint of accuracy of diagnosis alone. When the complement fixation test is properly standardized, both tests will become of practical value in the diagnosis of the tuberculous process."

As a negative answer and a warning to ophthalmologists against too great self assurance, we may here in-

sert the reply received from Dr. A. S. Warthin, Dept. of Pathology, University of Michigan, who writes: "I have had no experience at all with the clinical diagnosis of ocular tuberculosis. The pathologic findings in a number of cases sent to me, diagnosed clinically as ocular tuberculosis, have, on microscopic examination, been shown to be something else, but I am unable to give the clinical details upon which such diagnoses were based."

Dr. A. Magitot of Paris gave a negative reply with the following explanation:—"Such a method has been followed by several authors to prove the tuberculous origin of phlyctenular keratitis. If you take two equal sets of children, one having phlyctenular keratitis and the other without any objective sign of tuberculosis, it will turn out very often that the second lot will give nearly as many positive reactions as the first. In resumé, if the tuberculin reaction is negative, its value is very great, but if positive I think it is sufficient only to give a presumption but no certitude."

Two of the answers received sound a warning against the use of subcutaneous injections of tuberculin as a diagnostic test. Dr. F. W. Huntoon of the Mulford Laboratories writes, "While this method is effective from the diagnostic viewpoint, we consider it essentially dangerous as there is no way of controlling the amount of reaction produced." Dr. A. C. Woods writes, "I dislike the subcutaneous diagnostic use of tuberculin. Rather better, in so far as about as much information is obtained and a focal reaction (always dangerous in ophthalmology) is avoided, is the intradermal test, with various dilutions of tuberculin."

When the diagnostic test injections are begun with extremely small doses, such as 0.001 mgr. to 0.0001 mgr. of old tuberculin, instead of with 1. mgr. as formerly, these warnings are quite superfluous, for the amount of the reaction can be controlled. The writer has noticed a focal ocular reaction in one or two instances following a von Pirquet dermal test. For a time we

thought perhaps this was the ideal way, as the focal ocular reaction would certainly be very mild—however, it was too uncertain. Without the focal ocular reaction you do not possess "about as much information" as Dr. Wood assumes, nor is the statement correct that the focal ocular reaction is "always dangerous". When properly conducted, a mild focal ocular reaction can be obtained which is really the beginning of the cure of the ocular lesion. The indiscriminate use of tuberculin subcutaneously is never justifiable.

Question No. 3 was: "Have you observed focal reactions from the injection of nonspecific substances?"

(a) What substances? (b) In what type of lesion? (c) With what degree of regularity?

Twenty-four replies were noncommittal on this question. There were seven negative answers. Among these, Dr. M. P. Ravenel of the University of Missouri writes as follows: "I have never seen true reactions follow the injection of any nonspecific substance. I have seen preparations containing glycerine give reaction which might be mistaken for true reactions." Dr. F. A. McJunkin answers this question negatively, but explains that he does so because he understands the question to refer to focal reactions from nonspecific substances in tuberculous individuals or animals. The writer regrets that Dr. McJunkin limited his reply to this class of cases in which he says he has not made such observations, for it is understood that Dr. McJunkin has studied other nonspecific reactions quite extensively.

Finally, there were four affirmative answers to this third question which must be given due consideration. Dr. W. F. Petersen, University of Ill., writes that he has observed focal reactions after the injection of iodides, milk, proteoses, etc., in skin lesions and in pulmonary lesions, but that they occurred irregularly. Dr. J. A. Kolmer, University of Pennsylvania, writes that he has observed focal reac-

tions from milk injection (10 c.c., intramuscularly) in arthritis, also irregularly. He adds by letter—"I think the question of focal reactions being elicited by the injection of nonspecific substances is one of very great importance. I have seen unmistakable evidence of focal reactions following the intramuscular injection of sterile milk and large amounts of bacterial vaccine, but I have never been able to elicit focal reactions in tuberculosis by amounts of these substances as small as is sufficient of tuberculin to bring about a reaction. For this reason I believe that focal reactions can be elicited by specific and nonspecific stimulants. In my opinion, the specific reaction is allergic and the nonspecific reaction is due to unknown factors, of which leucocytosis and the mobilization of proteolytic ferments or antibodies may be of importance."

Dr. Leo Loeb, Professor of Comparative Pathology, Washington University, St. Louis, writes, "I know from personal experience that intravenous injection of nonspecific substances, like proteoses and other colloids, may cause transitory inflammatory reactions around various lesions at a distance from the place of injection."

The writer has observed both ocular focal and general reactions from the intramuscular injection of milk. One of these was an acute staphylococcus infection following perforating injury of the eye by fragment of steel; and the other was a case resembling phlyctenular keratitis in a physician aged 35 years. This was a long standing chronic trouble with frequent acute exacerbations especially after exposure to wind or dust and cold. In this case Dr. Patton of Omaha was inclined to accept an increase in the photophobia and ocular congestion after a test injection of 1 mgr. of tuberculin as a focal reaction to tuberculin, but gave us therapeutic injections. The patient recovered without tuberculin, and after a recent relapse has shown marked improvement following repeated intramuscular injections of milk (6 c.c. at a dose).

Scanning the literature recording the results of recent investigations on tuber-

culosis will give some explanation for the difference of opinion as shown by the responses to our questionnaire.

In the first place there is apparently no such thing as the establishment of a true immunity against tuberculosis thru the use of some form of tuberculin, as was conceived possible by Koch. No such immunity can be achieved against tuberculous disease as has been achieved by vaccination against typhoid fever or diphtheria. Petersen states that by the use of Koch's method in tuberculin therapy there was a "demonstrable increase in antibodies—bacteriolysins, agglutinins, and precipitins; but despite this augmentation patients frequently went to a fatal termination under circumstances that warranted the belief that the tuberculin treatment had harmed them." He adds "we have at present no clear cut evidence that resistance to an established tuberculosis is related to antibody concentration of the serum or tissues. Titze as a result of extensive animal experiments says 'nothing speaks with any certainty for the fact that the organism destroys invading tubercle bacilli thru the agency of antibodies or of phagocytosis.....healing is rather to be sought in the fixation of the bacilli by the tissues.' Haupt, Schurr, Citron, and other investigators have come to the conclusion that resistance to tuberculosis does not parallel the antibody concentration." Kraus, Landmann, Loewenstein and Volk, Aronson, Bessau are also referred to by Petersen as having "published observations which have led them to doubt the adequacy of the antigen-antibody conception."

An interesting fact concerning the nature of tuberculin, which is generally ignored but which distinguishes it from the toxins used to produce immunity from typhoid and diphtheria, is brought out in the following quotation from Kolmer's paper. "In the first place tuberculin is not a poison or toxin, because relatively enormous amounts may be administered to nontuberculous animals with impunity. Kraus has injected as much as 30 c.c. intravenously into healthy guinea pigs; and Hamburger has given healthy infants as much as 1



c.c., at close intervals, repeatedly over a long period, without ill effects. But the injection of one-millionth of c.c., may make a tuberculous adult ill. For the tuberculous, therefore, tuberculin acts like a virulent poison; for the nontuberculous it is relatively inert. Why the difference? From whence arise the toxic effects in the tuberculous individual if the tuberculin is not toxic? The evidence quite clearly indicates that these toxic substances arise from the tuberculous foci, and tuberculin stimulates and facilitates their absorption by producing hyperemia and other inflammatory changes in the tissues surrounding these foci. Similar effects may be produced in the patient by exercise. The ordinary constitutional symptoms of tuberculosis are quite similar to the general tuberculin reaction, and both are due to the passage of toxic substances from the focus of disease into the general circulation. Why and how does tuberculin produce this inflammatory reaction around foci of tuberculous infection? This is an unsolved mystery, but evidence indicates that it is an allergic phenomenon—an example of local allergic shock." That more definite information may soon be available is promised by the painstaking detail with which modern investigators have attacked these problems, as is shown by the following quotation from Petersen:

"The tubercle bacillus differs from most other organisms in its abundant fat and wax content, some 35 to 45 per cent. of the total dry weight consisting of lipid bodies, including waxes, fatty acids and neutral fats. When such bacteria undergo disintegration in the tissues this relatively resistant waxy material remains in situ for a considerable period of time. It happens that these lipoids, being unsaturated provided their state of dispersion be great enough, act as anti-ferments against tryptic and leuko-proteolytic ferments. This property of checking proteolysis depends, therefore, on both a chemical configuration—the number of unsaturated carbon bonds available, and on a physical basis—the ultimate state of division or

dispersion. These fat and wax bodies probably do not exist free as such either in the living bacilli or in the infected tissues after the death of the organisms, but most probably as an intimate protein-lipoid combination, that is, a combination in the physical rather than in the chemical sense.

As the tubercle bacillus finds lodgment and multiplies in the tissues, it entails the destruction of a certain number of tissue cells. This is brought about thru the excretion of toxic metabolic products, or possibly thru the medium of extracellular bacterial ferments. Under ordinary pathologic conditions, tissue death is followed by autolysis and the removal of the fluid end products thru the vascular channels. It is apparent that this does not take place in caseation; autolysis is in some way prevented and the necrotic debris accumulates. It is true that the cellular reaction about the tubercle does not include polymorphonuclear leucocytes, which, because of their abundant proteolytic ferment content, liberated when they disintegrate, hasten autolytic processes; instead we find lymphocytes, the lipase carrying cells. But tissue autolysis does not depend on the presence of polymorphonuclear leucocytes, and the absence of autolysis in caseous foci indicates some inhibitory factor. The explanation for this is found in the presence of the unsaturated lipoids derived from the tubercle bacilli. These are able to bind and inhibit the action of any autolytic ferments that may be present and thereby prevent autolysis. That this is actually the case is readily demonstrated by the fact (a) that caseous material when extracted by the lipid solvents will become digestible by trypsin; (b) that the lipoids extracted will act as anti-ferments and will, when injected into normal tissues, cause typical caseous foci. Of equal importance is the fact that when caseous material is treated with iodine, which presumably saturates some of the unsaturated carbon bonds, tryptic digestion can take place.

In general terms, we can consider the tubercle as a necrotic mass consisting of native proteins and of lipoids derived

partly from the cells and partly from the tubercle bacilli, together with some of the higher and less diffusible protein split products. Bounding this necrotic mass we have to consider connective tissue, endothelial cells, lymphocytes and a few polymorphonuclear leucocytes; the whole permeated with the tissue fluid, which in man contains only a moderate amount of lipase, some protease and peptidase, and a large amount of anti-ferment, the latter in an amount quite sufficient to overbalance any ordinary extracellular proteolytic activity. The quiescent tubercle represents a balance between the digestive and digestion inhibitory forces; that is, it serves as a potential source of toxic split products derived from the necrotic material, potential rather than actual, because the active autolysis and removal into the circulation of the products of autolysis is prevented by the anti-ferment. Any factor that will alter the conditions of this delicate balance so that autolysis can occur will bring about a toxic reaction, that is, a tuberculin reaction. This may be brought about if we increase the ferments of the serum, or decrease the anti-ferment of the necrotic focus or of the serum. It is apparent that *such an alteration need have no relation to specificity.*"

With reference to the specificity of the tuberculin reaction, the following quotation will show the diversity of problems presented and the difficulties which stand in the way of any categorical statement.

"Feistmantel extracted an acid-fast streptothrix and obtained an active tuberculin. On the other hand, leprosy and actinomycotic patients are said to react strongly to tuberculin. The tuberculous individual will react to many of the following substances, injected either subcutaneously or intravenously, with a typical tuberculin reaction and constitutional symptoms, while the nontuberculous individual will tolerate equal doses without reaction; these include the following: hypertonic salt solution; distilled water; iodids; some colloidal metals; protein split products; ferments; immune (tuberculous) serum; heterol-

ogous serums; exudates; photodynamic insults (heliotherapy, roentgen rays, deep red rays, etc.). From the evidence presented it seems probable that the ferment mobilization, however produced, will influence the tuberculous focus and bring about a general reaction if the digestion be of sufficient degree. From this point of view, we can understand the undeniable lack of specificity associated with the general reaction; any agent that will bring about a ferment-anti-ferment balance favorable for proteolysis will effect a general reaction provided the focus be sufficiently unstable. That the various vaccines, protein split products and even inert physical agents will do this has been demonstrated. Similarly Pfeiffer observed such changes following burns of varying intensity, making it apparent why, when a patient during the course of heliotherapy burns to a moderate degree, a tuberculin reaction with focal and general effects may result. Conversely we can understand that in any infectious granulomas, in which a balance exists similar to that obtaining in the tubercle, the injection of tuberculin will be followed by a marked febrile reaction."

Observations showing inhibition of the tuberculin reaction were collected by Petersen as follows:

"Von Pirquet observed, that during measles and streptococcus infections, the tuberculin reactions became negative; Brandenburg found this to be true for scarlet fever, and Krannhals as well as Glintschikow observed the same condition in typhoid, pneumonia and acute articular rheumatism. Cossolino, working with pertussis, and Moltschanoff with diphtheria and serum sickness, also observed this phenomenon. The resistance to tuberculin during and following serum reactions in children was confirmed by Luithlein. We are evidently dealing here with a general state of resistance to the local and in part the general tuberculin reactions during practically all the acute infections, during certain of the cachectic conditions, and following protein shock reactions (serum reactions)."

Finally the present concept regarding the curative effect of tuberculin therapy is given in the following extract from Kolmer's paper:

"We have seen that the tuberculin reaction is accompanied by the production of hyperemia and serous and cellular exudation. It is commonly believed that we recover from tuberculosis by the production of fibrous tissue around the foci. The thicker and denser this capsule the more complete is clinical recovery even tho the capsule may enclose living bacilli. The cutting off of blood and lymph supply to the focus by this fibrous capsule gradually results in death and liquefaction of the contents, including the bacilli. Anything favoring the development of this capsule is, therefore, therapeutically advantageous.

Has the tuberculin reaction this effect? According to Kraus who has studied this problem with particular care, it has. It is a well known principle of pathology that chronic passive congestion is followed by fibrosis. Tuberculin in proper dosage and spacing of injections can elicit a series of mild allergic shocks about the focus of disease maintaining a more or less constant degree of hyperemia. Evidence indicates that this is followed by fibrosis, and fibrosis is greatly desired. Therefore, in chronic tuberculosis where the lesions are localized in a certain organ or organs, the administration of tuberculin is advantageous."

The principles underlying the application of general therapeutic measures in tuberculous disease are so well outlined in the following paragraphs by Petersen that they merit more than momentary consideration even by ophthalmic practitioners.

"It may be of interest to note in how far more or less established empirical therapeutics has followed along lines that influence the ferment-antiferment balance. This can be divided into two general groups, the first having to do with fats and lipoids of various kinds. Czerny in a very interesting paper has presented evidence that the immunity of the nursing infant to many of the ordinary infections is not due to immune bodies furnished in the milk of the

mother, but is closely related and dependent on the fat constituents of the milk, which in some manner augment the resisting power of the infant. Among empirical remedies used in tuberculosis, fats have played a large role, including the highly unsaturated fish oils, milk, cream and the yolk of eggs; the use of phosphorus must be included in this category. In the consideration of the value of just these substances, it is interesting to recall that Fermi noted the antiferment property of milk and eggs many years ago; and it can be demonstrated experimentally that the antiferment of the lymph is gradually increased after a meal of milk. Braunstein and Kepinow found that phosphorus increased the antiferment, and the increase in the antiferment following the continued use of the unsaturated oils seems logical considering the probable constitution of the antiferment lipoids. The feeding experiments of Weigert are also of interest in this connection. \* \* \*. The second school, the foremost advocates of which we find among the French clinicians, has placed greater reliance on iodine and its compounds, but chiefly on free iodine. Apparently such therapy has decided value in glandular tuberculosis, and with apparent reason. By this method of therapy the antiferment is probably reduced and the connective tissue reaction about the focus lessened, so that a slow and gradual exposure of the focus follows. If this focus be in lymphatic tissue where lipolytic activity is provided by the lymphocytes, the tubercle bacilli are probably destroyed when they are exposed to such activity; if the focus is in pulmonary or other nonlymphatic tissue, the effect of the iodine may simply be in the nature of an autotuberculinization, in which digestion is first aided, then checked by the antiferment reaction that follows the digestion. Theoretically, this seems ideal therapy in the early case in which the body is able to withstand a certain amount of intoxicating material gradually absorbed."

From this discussion the following conclusions may be drawn:

1. A focal ocular reaction caused by a test injection of tuberculin renders the

diagnosis of ocular tuberculosis highly probable, but does not make it absolutely positive.

2. The therapeutic benefits obtained from the use of tuberculin in ocular tuberculosis must be recognized but can be explained rationally either as a specific or a nonspecific effect.

3. Clinical experience demonstrates that the radical elimination of focal infections especially those of the nasopharynx and the proper treatment of any coexisting constitutional disease will render less and less frequent the indications for the use of tuberculin, either as a diagnostic or therapeutic agent in ophthalmic practice.

4. Further research is needed to discover the unknown factors concerned in resistance to tuberculous disease. Thus the treatment of tuberculosis may be placed on a definite scientific basis which

it can hardly be said to possess at the present time.

On account of the facility for the accurate observation of minute changes in ocular lesions by the aid of microscopy of the living tissues made possible with the slit lamp, corneal microscope, and Gullstrand ophthalmoscope, ocular tuberculosis may offer a most fertile field for future research.

It is a privilege to acknowledge the receipt of so much help from so many interested observers, both inside and outside of the group of ophthalmic specialists, in the collection of the material for this report. The writer hereby expresses his thanks to each and every one of them and especially to Dr. M. S. Fleischer, Dept. of Pathology, St. Louis University School of Medicine, for his active cooperation in the preparation of the questionnaire and classification of replies.

### CORNEAL DEPOSITS OF CHOLESTERIN AND LIME SALTS DISSOLVED BY ALCOHOL.

LOUIS F. LOVE, M.D.

PHILADELPHIA.

Many attempts have been made to remove corneal opacities by dissolving them by local applications. This paper records a striking and rapidly successful effort in this direction and the method appears to be safe. Read before the American Academy of Ophthalmology and Oto-Laryngology, September, 1922.

The case here reported is that of Joseph O'Neil, nine years old. In 1908, the patient was treated in the ophthalmic department of the University of Pennsylvania, as well as in St. Mary's Hospital, where he applied for eye treatment, giving the following history:

Measles at 3 years of age, since which time the eyes have been inflamed more or less constantly.

The right eye showed an opaque band extending across the lower third of the cornea. Numerous dot like opacities, varying in size and density from pinpoint to pinhead, and in color from gray to a chalky white, were present, and were denser and more numerous toward the nasal side. To the outer side the cornea is hazy, and the pupillary space was found to be covered by chalky deposits. V.=20/50.

The left eye showed opacities that occupied a central position in the cornea; they were circular in outline. The pupillary space is also covered by deposits. V. O. S.=3/100.

A number of the cervical glands were enlarged, but no scars were found. The laboratory reports were inconclusive, and gave a tentative diagnosis of rickets. Night sweats were present. At that time the clinical diagnosis was uncertain, and rested between keratitis dendritica or the well known band shaped keratitis, or ulcerative keratitis.

In 1916 the patient returned to St. Mary's for glasses. On examination, numerous deposits of cholesterol crystals or lime salts were found distributed over both corneae, including also the pupillary areas. Vision before operation: O.D.=20/70; with correction 20/30??; O.S.=15/CC.



Ophthalmoscopic examination of the right eye showed the cornea to be maculated, with numerous deposits of cholesterol or lime salts distributed thruout the structure. No gross pathologic changes in the eyeground were found.

The cornea of the left eye was in practically the same condition as that of the right. In this eyeground, however, to the temporal side, a large patch of choroidal atrophy was discernible, with evidences of absorption, surrounded by pigment extending to the macular region. The Wassermann test was negative, as was also the urinary examination. Tubercular tests were not satisfactory.

The patient was admitted to St. Mary's Hospital for operation. The right eye was operated on first. The epithelium of the cornea, Bowman's membrane, and the deeper tissues which covered the cholesterol deposits were picked off with a discission needle. A 95 per cent solution of alcohol was applied. This immediately dissolved the lime, which infiltrated the cornea and spread over the surface, making the entire cornea milky white in color. This was somewhat alarming, and gave rise to the fear that irreparable damage might have been inflicted on the eye. On the following day, however, the solution had entirely absorbed, and the cornea was clear and bright. After a few days the left eye was operated on with similar results. The vision improved; O.D., 20/70, with 3D.  $\ominus$  0.75 D. ax 165 gave 20/20??; O.S.=15/200 with S. 3.50 D.=20/100.

A careful search thru the literature has failed to disclose the reports of cases similar to the one here described, in which the treatment of cholesterol deposits by alcohol solution was employed. In Wood's Ophthalmic Therapeutics, page 394, Birnbacker recommends for the removal of calcareous deposits in the cornea, that the chalky infiltration be touched with a 5 per cent solution of hydrochloric acid, which should at once be neutralized by sodium carbonat of similar strength.

In Noyes' Diseases of the Eye, page 382, the following statement is made:

"The calcareous deposit occurs beneath the epithelium in irregular specks and lines, and slowly increases during years. It gives rise to no irritation until it attains considerable size and causes erosion of the epithelium; it then acts as a foreign body, and should be scraped away under the influence of cocain."

In Norris and Oliver, Textbook of Ophthalmology, page 346, it is stated that Bowman, Dixon, Nettleship, and other English writers have had good results, and have improved the eyesight by cutting and scraping away the calcareous deposits. In some of these instances the good results have been permanent, and have not been followed by an increase of intraocular tension.

J. P. Nuel, of the University of Liege, Belgium, writing in Norris and Oliver's System of Diseases of the Eye, vol. iv, p. 243, states: "Special mention should be made of a rather frequent corneal disease which was described by von Graefe under the title of 'Bandular Keratitis.' On a plane with the palpebral slit, a grayish or somewhat yellowish, nonvascularized inflammation appears, which extends transversely across the cornea; its surface is finely granular or rough, like granite, and rather dry. As for treatment, nothing can be hoped for a clearing up of the macula. If the eye be not amaurotic, scraping of the cornea may be beneficial, as the reformed tissue is ordinarily more transparent than the macula."

In conclusion I feel quite sure that alcohol in these cases is a valuable remedy, but what impressed me more than anything else was that our knowledge at the present time as to the chemiophysiologic or pharmacologic action of drugs on the human eye is extremely meager. It seems to me that more experiments and investigations should be made, so as to enlarge our physiologic therapeutics. In other words, less study perhaps of pathology of the dead eye and more of the physiology of the living eye.

## NEUROFIBROMA OF THE ORBIT.

EDWARD STIEREN, M.D., F.A.C.S.

PITTSBURGH, PA.

In the case here reported the orbital tumor was removed without recourse to a Kroenlein operation. The laboratory report showed it to be a fibroma originating from nerve trunks. Read before the American Academy of Ophthalmology and Oto-Laryngology, September, 1922.

We have the authority of the President of our Academy, Dr. Walter R. Parker<sup>1</sup>; that cases of neurofibromata of the orbit are extremely rare, he being able to find but two cases on record, Tertsch's and Marchetti's. He quotes Tertsch as saying in this connection: "A solitary neuroma is altogether a rare tumor, and its location in the orbit appears at least a curiosity." Parker's case made the third to be recorded, which makes it appear that the case about to be reported is the fourth in literature of this unusual growth in the orbit.

The patient, a Hebrew, age 28, was referred by Dr. H. G. Wertheimer, June 12, 1919, to be refracted. The eyeballs were equal in size and in position in the orbits; pupils were equal and responded normally to light and to accommodation. Muscle balance, 4° esophoria distance, orthophoria near.

R. V. 6/20; L. V. 6/5. Under homatropin and cocain, R. V. 6/100, + 5.50 S.  $\ominus$  + 0.25 Cyl. Ax. 75° = 6/8; L. V. 6/40, + 2 S.  $\ominus$  + 0.25 Cyl. Ax. 150° = 6/4.

The media were clear and the fundi negative. Both fields were normal for form and color. A comfortable correction was ordered, which was increased to almost full strength three months later. Shortly afterwards, interesting developments began to manifest themselves in and about the right eye. The left eye can be ignored as it has remained practically the same.

October 27, 1919, he appeared, complaining of a full feeling in the right orbit and malar region. The vision in the right eye without correction was found to be reduced to 2/20. Under homatropin cycloplegia, he was again refracted, retinoscopy revealing 7.50 D. hypermetropia, and the trial lens improved vision to 6/15+ only. The retinal veins seemed slightly larger

than in the left eye, but no distinct pathology in the fundus could be detected. He was referred to Dr. George J. McKee for sinus examination, but all accessory sinuses were found to be normal.

A stronger correction was ordered for the right eye, which he wore with comfort. He was lost sight of for a year, when he appeared with a definite feeling of fullness about the right orbit, and it was seen that the right eye was becoming more prominent than the left. Under homatropin the error of refraction in the right eye had increased to +10 D. sph., which gave vision of only 6/30. The retinal veins had become extremely tortuous with a certain amount of retinal edema, mainly in the lower part of the fundus. The field of vision, which heretofore had been normal for form and colors, showed a marked reduction for red, 5° above and 10° below, while the field for green and blue amounted to central fixation only.

Blood and spinal Wassermanns, X-ray of the teeth and sinuses all proved negative. A diagnosis of tumor of the orbit was then made, probably involving the optic nerve. He was exhibited before the Pittsburgh Ophthalmological Society, October 25, 1920, and all the members present concurred in the diagnosis. Potassium iodid was exhibited over a period of six months, and the eye kept under close observation. Exophthalmos developed very slowly. In fact, as the photograph shows, exophthalmus was never very prominent. November 30, 1920; limitation in movement of the eyeball upwards was noted, and ocular movements in all directions became more restricted as time progressed.

Operation was urged, but as no assurance of the outcome could be given, it being thought that the tumor in-



Fig. 1. Neurofibroma before operation.

volved the optic nerve, the patient would not accede until annoying diplopia became constant. Desiring an outside opinion, a consultation was

arranged with Dr. George E. de Schweinitz, who wrote in abstract as follows: "It seems to me that the indications are definitely those of a tu-

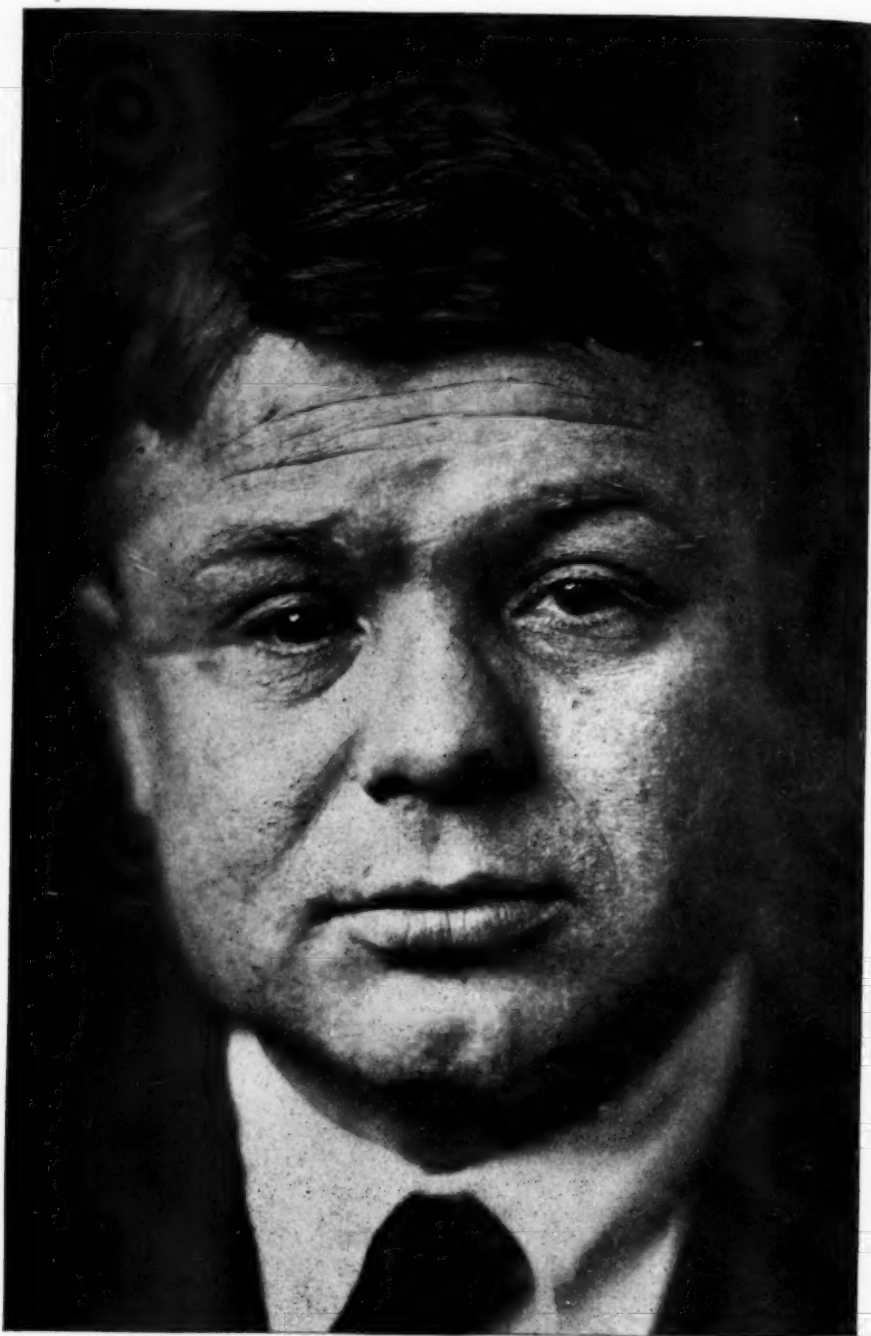


Fig. 2. Neurofibroma case after operation.



mor in the posterior portion of the orbit, and almost certainly connected with the optic nerve. The extraordinary edema of the optic nerve and edema of the retina, fully 10 D. in height, with the huge twisting of the vessels, etc., all seem to me more or less characteristic of an optic nerve growth, and it is distinctly my impression that surgical interference is indicated." On his return the patient consented to an operation, and accordingly was admitted to the Presbyterian Hospital, May 17th, 1921.

Having performed the Kroenlein operation some five or six times on the

a finger was introduced, and a round, hard mass below and behind the globe was felt. It was not attached to the optic nerve, but arose from the floor of the orbit, well back, and was removed by finger dissection. It was encapsulated, slightly nodular and almost round, measuring 25 mm. in diameter and weighed 5.5 grams. After the slight hemorrhage from the orbit had been checked by gauze sponges, the incision in the periosteum was sutured with No. 00 chromic catgut, the outer periosteum replaced, and the wound in the soft parts approximated with silkworm sutures. Heal-

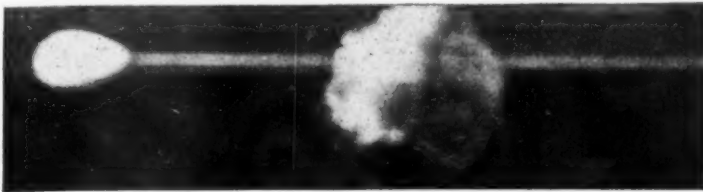


Fig. 3. Actual Size of Tumor.

cadaver, I have come to regard it as a most difficult procedure in gaining a route to the posterior of the orbit. I wish to subscribe to everything Edward Jackson said in his discussion<sup>2</sup> on Byers' excellent paper on Tumors of the Optic Nerve<sup>3</sup>, at Atlantic City in 1914, especially that Kroenlein's operation has a very limited field in Ophthalmology, and that in many cases of exophthalmos the posterior pole of the eye is on a level with the outer margin of the orbit. The configuration of the patient's head showed that he must have a shallow orbit with a broad base, and it was decided not to resect the outer wall.

After the usual preparation and under ether, a horizontal incision beginning at the external canthus and carried for about three inches toward the temple was made. After the outer periosteum was retracted, a half-inch of the outer orbital rim was removed with chisel and rongeur. A horizontal incision in the periosteum of the orbit was made above and parallel to the external rectus. Thru this opening

ing was uneventful and the patient left the hospital on the sixth day after the operation.

The specimen was given to Dr. de Wayne G. Richey, Pathologist to Mercy Hospital, for microscopic study, who conferred with Dr. Samuel R. Haythorne, Professor of Pathology in the University of Pittsburgh, on the unusual and rare type of tumor it proved to be. Their description follows and I desire to take this opportunity of expressing my deepest gratitude to them for their careful and painstaking study of the sections.

#### LABORATORY REPORT

"Sections of the tumor mass from the floor of the orbit showed a cellular structure covered by a fibrous capsule. The tumor consisted, for the most part, of wavy, parallel or intertwining bundles of fibrous connective tissue. These varied considerably in their density and cellularity. As a rule, the tumor tissue was compact, the fibrous fasciculi being arranged quite closely together. Where they

were looser, irregular empty spaces were seen, but these were not associated with mucoid or myxomatous degeneration, nor could any areas of necrosis be seen. The tumor cells were elongated and of a spindle type when cut longitudinally. Their cytoplasm was homogeneous. The nuclei were long and fusiform, finely granular and devoid of mitotic figures. Where a

nels scattered thruout it. Where the structure was most cellular, a finely granular, golden pigment, presumably blood pigment, occurred in the interstices between the cells. A few lymphocytes and plasma cells were scattered diffusely thru the sections.

Sections stained by phosphotungstic acid hematoxylin showed, at the periphery of the tumor, a moderate amount

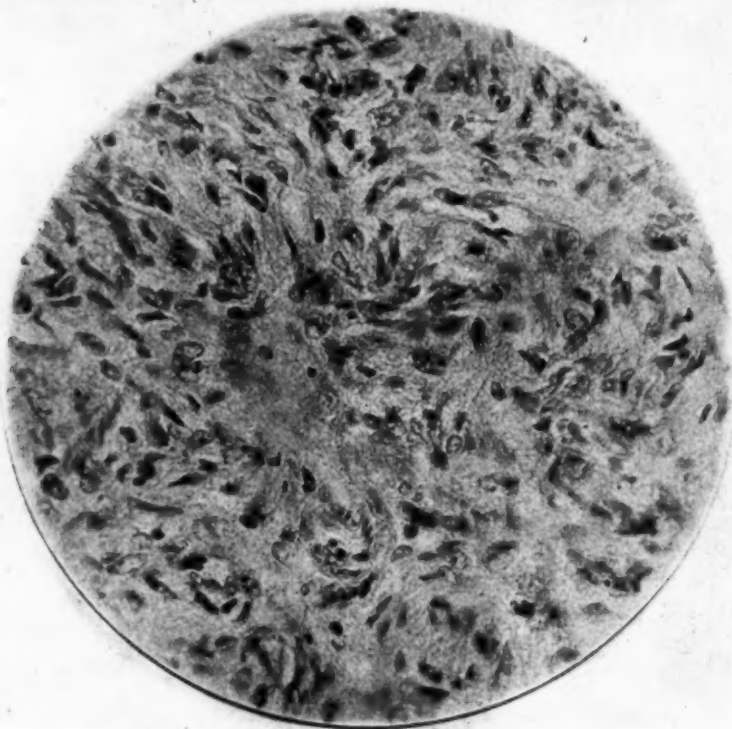


Fig. 4. Photomicrograph of section of neurofibroma of the orbit.

whorly arrangement was encountered, so that the cells were cut obliquely or in transection, the tumor appeared quite cellular and the cut ends of the cells had a round or oval shape, with oval vesicular nuclei. Here and there small crescentic clusters of cells were seen, which did not suggest the rosettes of a neuroblastoma as described by Wright. In the sections examined, no nerve tissue could be demonstrated. The tumor was not unduly vascular, there being a moderate number of well formed blood chan-

of collagen, resting in the intercellular spaces. The more central portions of the tumor were made up of younger connective tissue cells, some of which were definitely fibroblastic in nature.

An occasional fibril could be demonstrated, but none of these could be identified as neuroglial fibrils.

**Diagnosis:** It is clear that this tumor is a fibroma. In the orbit, fibromata derive their origin, most commonly, from two sources—the periosteum or the nerve trunks. The general structure of this tumor consists of numerous bundles

of fibrils, which are not extremely heavy, which show a marked tendency to intertwine, and between which fusiform cells often lie. As Ewing<sup>4</sup> indicates, a diagnosis of neurofibroma can be safely made on such findings, calling attention to the fact that, in periosteal fibromas, the bundles of fibrils are much larger and the intertwining is not so outstanding. It is also known that in the fibrous types of neurofibromata, nerve fibrils are usually missing, so that their demonstration is not essential for the diagnosis. There is also the probability that the fibroma can arise solely from the supporting tissues of the nerve, the nerve cells not taking part in the proliferation. In this instance, the diagnosis is neurofibroma, indicating the source of the tumor even in the absence of nerve tissue."

It has been interesting to observe the behavior of the eye following the operation. As the photograph illustrates, there is now a condition of enophthalmos, but this is scarcely noticeable behind the strong plus lens worn. The scar has healed until it is barely visible. The fundus picture has likewise entirely changed; the edema has disappeared, but there is and will always remain some tortuosity of the veins. The false hypermetropia has receded and the lens now accepted, +6.50 S., gives vision of 6/10—. Excursion of the eye is satisfactory in all directions excepting on extreme outward movement, where there is some lagging, due no doubt to adhesions to the scar in the periosteum.

*Conclusions:* 1. Progressive increase in hypermetropia does not necessarily indicate tumor of the optic nerve, nor does edema of the retina and optic nerve. Either condition may develop from any steady pressure from behind.

2. Operative measures should be instituted early to preserve the retina and optic nerve. Bull in his excellent monograph<sup>5</sup> states, "There may be an artificial hypermetropia by flattening of the eyeball from pressure of an orbital tumor. At first the ophthalmoscopic picture is negative, but as the pressure from behind continues and the obstruction to the return circulation becomes more complete, the retinal veins become engorged, the arteries narrowed and the picture resembles finally that of a papillitis, with hemorrhages in the retina and more or less extensive retinitis, ending in atrophy of the optic nerve."

3. Single neuromata of the orbit are unique and rare. They are not to be confused with multiple fibroma, where one or more nodules may form on the lids, the lobe of the ear and in other remote localities. Bull<sup>6</sup> makes no mention of neurofibromata of the orbit. He merely mentions fibroma of the orbit, and suggests Berlin's view that they should be classed as fibrosarcomata.

4. Orbital tumors can many times be removed without recourse to the Kroenlein operation. A horizontal incision in the temple and removing part of the rim of the orbit (if found necessary) is a much easier procedure and gives better cosmetic results.

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1. Parker. Neurofibroma of the Orbit. Kroenlein Operation. Trans. Sec. Ophth., A. M. A., 1907.
2. Trans. Sec. Ophth., A. M. A., 1914, p. 44.
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## MALIGNANT LYMPHOMA OF THE LACRIMAL GLAND.

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In this case the tumor was removed thru an incision parallel to the margin of the orbit. No capsule or place of gland structure was discovered. But it closely resembled a lymph node presenting the picture of malignant lymphoma. Read before the American Academy of Ophthalmology and Oto-Laryngology, 1922, in the Transactions of which appears a full bibliography.

Tumors of the lacrimal gland are uncommon, so that the report of isolated cases are warranted. In Volume 5, No. 6, June, 1922, American Journal of Ophthalmology, there is a painstaking study of the Tumors of the Lacrimal Gland by Laura A. Lane of Minneapolis, in which there is a historic review, summary of the embryology, and histology of the lacrimal gland, a discussion of the pathology of its tumors, and classification of the types of new growths, reported.

As Dr. Lane has pointed out, only 229 cases have been reported in 323 years. A study of the cases made in her paper shows, contrary to general belief, lacrimal tumors are not benign, showing a death rate of 12.63 per cent, and that metastasis is to be reckoned with.

### CASE REPORT.

Mrs. J. E. H., age 51 years, first seen July 1920. Family history without interest.

The patient contracted syphilis from her husband 18 years ago, for which she underwent thoro treatment from competent medical advisors over a period of five years, and has had frequent examinations with no evidences of syphilis since her primary infection. Eight months ago, a small, hard, firm lump appeared in the left tear gland region, which has gradually continued to enlarge. She consulted a competent ophthalmologist who, in view of her specific history, put her under a thoro course of mercury, without influence upon the growth of the mass. There has been no loss of weight or reduction in her general well being.

*Examination:* The patient is a woman of spare frame, but appears wiry and strong. An examination made by her family physician reveals no general pathologic condition; the kidneys,

heart and circulation are normal. There is no enlargements of the lymph nodes. Repeated Wassermann tests, submitted to several laboratories are negative. One spinal puncture reported as negative.

Right vision 6/15, corrects to 6/5—1; Left vision 6/15+1, corrects to 6/6—3+2. Neither fundi show ophthalmoscopic changes, there being no changes in the retinal circulation in either eye. There is a slight ptosis on the left side, which is not increased upon the instillation of cocain. Excursion of the globe is free in all directions, except some impairment in extreme upward excursion. Exophthalmos of 1 compared with the right eye, measured by the Hertel instrument. The pupil reactions are normal.

In the lacrimal gland area, there is an oblong mass, parallel to the orbital rim, measuring approximately 18x10 millimeters. The skin is freely moveable. A furrow can be made out, which corresponds to the orbital rim, but the mass, which is quite hard, is apparently firmly lodged in the fossa. Upon eversion of the lid, a mass presents behind the tarsal plate. The preauricular glands are not palpable, nor is there enlargement of the sublingual. Stereoscopic plates of the head showed no thickening of the orbital bones.

Under infiltration anesthesia at the Buffalo General Hospital, thru an incision parallel to the orbital margin, a mass was found in the lacrimal fossa, which was fairly firmly adherent to the periosteum. The fossa was cleared out and a mass, measuring 25x15x8 removed. There was no capsule or trace of gland structure. The wound closed kindly and promptly.

The specimen was sent to the State Institute for the Study of Malignant Diseases, from which the following re-



port was made: "Specimen removed from the eye of Mrs. J. E. H. shows same to be of neoplastic character. The growth consists of round cells, with deeply staining vesicular nuclei and very scanty protoplasm. The cells are closely packed and are supported by a coarse connective tissue stroma running thru the structure, with only a slightly reticulated stroma between them. In some portions of the growth, there is a slight suggestion of alveolar arrangement. Thin walled capillaries are found running thru the substance

of the growth. The structure, on the whole, closely resembles that of a lymph node, without the special structure characteristic of these organs, and presents a picture of malignant lymphoma."

Within a few days after leaving the hospital, the patient was referred to Dr. B. F. Schreiner, who subjected the patient to heavy doses of radium emanations. There has been no recurrence, or change in the movement of the superior rectus or levator.

### TUMORS AND CYSTS ARISING NEAR THE APEX OF THE ORBIT.

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This paper gives a brief summary of the characters and symptoms of such tumors, and reports eight cases. These cases all came to operation and the microscopic examination of the growth is included in the report. Read before the American Academy of Ophthalmology and Oto-Laryngology, September, 1922.

Tumors and cysts of the orbit, arising in the neighborhood of the optic foramen, may originate in the soft parts of the sphenoidal fissure, near the apex, in the optic nerve or its sheath, or in the soft tissue of the orbit itself. Very rarely a tumor of the bone or a cholesterol cyst will arise from the walls of the orbit.

Tumors and cysts arising from bony tissue are usually slow growing and produce changes that can be detected by means of the roentgenograms. A shadow will be cast by a thin bony contour protruding into the orbit, or as a result of bone destruction. Soft tumors rarely give rise to changes discernible in the roentgenogram, even tho the normal content of the orbit is entirely extruded, and there is extensive destruction of soft tissues from the rapid growth of a malignant neoplasm.

Small tumors may exist in the posterior part of the orbit for years, growing very little and only slightly interfering with ocular rotation and vision. The earliest symptom in such cases is protrusion of the globe, or proptosis. This may precede visual disturbances for several years, and disturbance of

motility for several months, depending on the size of the tumor.

Next to proptosis, edema of the lids is the most common symptom. Often the swelling of the lids, with little proptosis and no palpable evidence of orbital tumor, has been thought to be due to nephritis or sinus disease. It is rather uncommon to find a person with swollen lids associated with orbital tumor, who has not had an intranasal operation for relief of that symptom. Swelling of the lids is usually greatest when the tumor overrides the globe in the superior and nasal quadrants; this sign may serve to indicate the most probable location of the tumor.

The operation of choice for the removal of a retrobulbar tumor depends largely on the appearance of the lids and the position of the globe, except in instances in which the tumor can be definitely palpated beneath the rim of the orbit. Hudson advised removal of tumors of the optic nerve thru the soft tissues, unless some vision remains, or there is some doubt with regard to the diagnosis. If there is vision, he advises the Krönlein operation. Even tho an eye is sightless, it is well to try

to remove the tumor without enucleation and without destruction of the globe.

In tumors of the soft tissues, I prefer to use the direct frontal route, making a skin incision as for a Killian operation. The soft parts should be

sible. The Krönlein operation is distinctly valuable in removing tumors within the muscle cone, when it is desired to save the globe. The contour of the face and orbit, however, often renders the operation quite difficult, as the lateral wall of the orbit may be



Fig. 1. (Case A366379). Photograph showing proptosis of left eye nine months after onset. Tumor removed by direct frontal route.

cut down to the bone, about 0.6 cm. above the superior orbital rim. The periosteum should be elevated around the margin of the orbit, and the periorbita on the superior and nasal sides, and the contents of the orbit depressed and retracted until a finger can be easily inserted almost to the apex. The orbital contents may then be palpated and even a small tumor felt anywhere within the orbit. The periorbita should then be incised nearest the location of the tumor, and the mass removed by blunt dissection with small scissors or forceps, care being taken to mutilate the orbital structures as little as pos-

quite thick, and, when turned back, allows little additional room for work.

Tumors of the intracranial portion of the optic nerve are rare, as are tumors of the optic nerve and its sheath. When they can be diagnosed the operation described by Dandy may be advisable. Hudson, in 1912, collected 154 cases of tumor of the optic nerve, and I have been able to collect reports of forty-six other cases from available literature, altho some of these are evidently repeated cases, and in some the diagnosis was not confirmed. I wish to present here the clinical data and the pathologic re-

ports on eight cases I have observed of tumor or cyst arising from the optic nerve or its sheath.

#### REPORT OF CASES.

**CASE 1 (A366379).** Miss V. B., aged eighteen years, entered the Clinic July 27, 1921, because of proptosis and swelling of the lids of the left eye (Fig. 1). In September, 1920, she first noticed transient swelling of the left eyelids, which later became continuous and marked. Pain had not

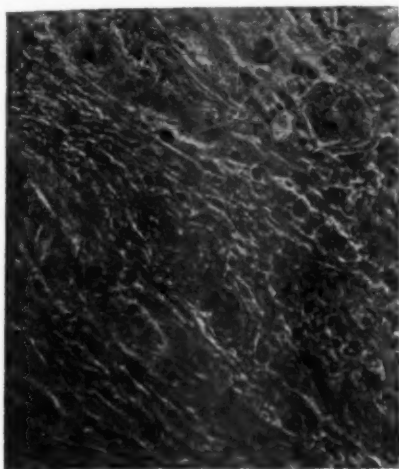


Fig. 2. (Case A366379). Section of endothelioma (x 200).

been associated with this swelling until a month before, when she had had a feeling of pressure thru the temples, more marked on the left side. She had not had diplopia. The vision was not impaired, and the extraocular movements were normal.

**Examination.**—Vision in both eyes was 6/5. There was some swelling of the lids of the left eye and proptosis of 8 mm. The globe was pushed directly forward. In both eyes the media were clear and the fundi were normal, altho the nerveheads were somewhat hyperemic, with slight blurring of the margins of the disc. The retinal vessels were normal. A roentgenogram of the head revealed definite increased density over the area of the left orbit. Examination of the nose and pharynx was negative. A complete general and neurologic examination was negative,

except for a compensated cardiac lesion of long standing. A diagnosis of orbital tumor was made by exclusion, and exploratory operation was advised.

**Operation.**—August 10, 1921, an incision was made along the rim of the orbit from the middle of the brow to below the external canthus, thru the palpebral ligament. The periosteum was excised, and dissection carried down to the apex of the orbit. A soft mass at the apex, which seemed to be connected with the lacrimal gland, could not be entirely removed, but after dissection was carried thru the cone to the nerve; pieces of the tumor could be removed with forceps.

Microscopic examination revealed endothelioma. A section contained numerous medium sized, oval and round vesicular nuclei (Fig. 2), between which was a fair amount of fibrillar intracellular material. The blood supply was generous, and the larger vessels had well formed walls. The nuclei varied in size, but stained uniformly; mitotic figures were not conspicuous.

The patient was dismissed September 1, after radium had been applied. The media of the left eye were clear, but there was 2 diopters of swelling of the nervehead, and the retina was edematous. The vessels were engorged and tortuous, but no hemorrhages were visible.

February 27, 1922, the patient returned for examination. She had had considerable continuous headache for the past three months, from the reaction produced by the radium. During the last two or three weeks, the headaches had been less severe. Vomiting did not occur except on the day after radium had been applied. The swelling in the left orbit never receded after the removal of the tumor. A few weeks after the patient returned home, the sight of the right eye failed rather rapidly, so that for the past three weeks vision had amounted to only light perception. The vision of the left eye, which was good when she left the Clinic, had also failed rapidly. On examination, she had no light per-

ception in the right eye, and only light perception and doubtful projection in the left eye. There was moderate edema of the lids of the left eye and proptosis. The exophthalmometer readings were 24 left and 17 right. External ocular movements of the left

light, but did react to consensual stimulation. The media were clear. The nervehead was swollen about 4 diopters. The retina around the nervehead for 2 or 3 disc diameters was irregularly swollen. The veins were engorged and extremely tortuous. There



Fig. 3. (Case A311349). Photograph showing proptosis of left eye six years after onset. Note the contracture of the fingers of the left hand, due to neurofibroma in elbow. Tumor removed by Krönlein operation.

eye were markedly impaired, but the patient could move the eye for a slight distance in all directions. The movements of the right eye were not impaired. Examination of the right eye showed the cornea to be clear, and the anterior chamber of normal depth. The pupil was dilated to about 6 mm. in diameter, did not react to direct

were wide areas of white exudate along the course of all the vessels for a distance of 2 disc diameters from the disc. The macular region was thickly spotted with white dots and lines, giving the appearance of an imperfect star. The cornea of the left eye was clear, and the anterior chamber of normal depth. The pupil was dilated to



about 4 to 5 mm., and reacted to direct light. The media were clear. The nervehead was swollen to about 4 diopters. There was swelling of the retina for 2 disc diameters beyond the disc margin, with intense engorgement of the veins. There were areas of white exudate along the line of some of the vessels and marked inflammatory changes in the region of the

months before, he had fallen from a bicycle, striking on the back of his head; he was unconscious for one-half hour. He vomited frequently for twenty-four hours. Nineteen months later, he had mumps, and immediately afterward, his mother noticed slight proptosis of the left eye, which had increased gradually for two years. (Fig. 3.) Since then (about four years) the

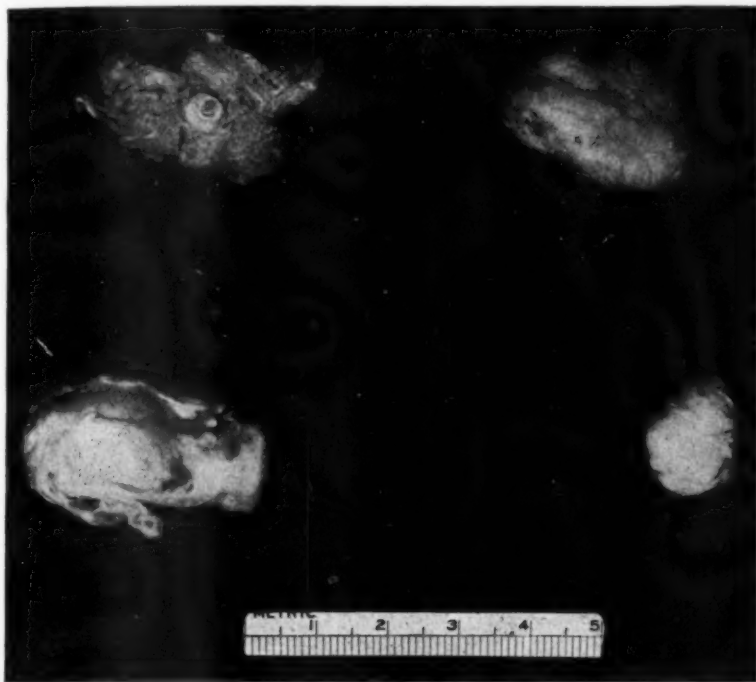


Fig. 4. (Case A311349). Section of tumor with optic nerve going through the mass.

macula, similar to those in the right eye. The patient had slight buzzing and ringing in both ears and pronounced impairment of hearing in the left ear.

A few weeks later, an exploratory operation was performed elsewhere. A large infiltrating tumor was found to extend along the base of the brain from the optic foramen back as far as could be seen. The pathologic diagnosis on tissue removed from the brain was sarcoma.

CASE 2 (A311349). Mr. B. P., aged twenty years, entered the Clinic in April, 1920, because of prominence of the left eye. Seven years and seven

condition had remained practically stationary. In April, following the onset of proptosis, the vision of the left eye began to diminish. In August, he was told by an oculist that the optic nerve was inflamed. Vision was 6/60 and had remained stationary for the last three years. Every summer for four years, he had had an attack of severe pain, beginning in the left eye and passing to the right eye. This was followed by vomiting of short duration.

*Examination.*—The upper and lower lids of the left eye were swollen and of soft, doughy consistency. The lids were deeper red than those of the right eye. There was a ptosis of 4 mm.,

due to edema, and 9 mm. exophthalmos directly forward by Hertel's exophthalmometer. In the primary position the visual axes were parallel.

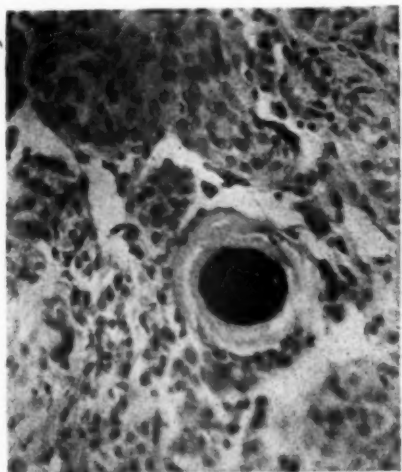


Fig. 5. (Case A311349). Section of endothelioma showing psammoma body (x 200).

There was good movement of the left eye to the right and to the left, altho there was some limitation of movement in the field of the external rectus. The eye could be elevated only about 10 degrees and depressed about 20 degrees. In the depth of the fornix, the vessels were injected. No definite mass could be palpated. The orbital margin was not eroded. The eye could not be pressed backwards into the orbit. There was no swelling of the face beyond the orbital rim. The cornea was clear, the iris dark blue, and the pupil round, 2.5 mm. in diameter, equal to the right pupil. The light reflex was present, but diminished; the convergence reflex was good. Vision equalled 6/60. There was papilledema of 2 diopters. A small tumor removed from the left antecubilateral fossa for diagnosis proved to be neurofibroma. A small tumor removed later from the



Fig. 6. (Case A323522). Photograph showing proptosis of right eye seven years after onset. Tumor removed by direct frontal route.

leg also proved to be neurofibroma. A tumor from the spinal cord was diagnosed endothelioma (psammoma).

*Operation.*—A Krönlein operation was performed April 20, 1920. A firm, fibrous, flat, round tumor, 2.5 by 1.2 cm. in diameter, was found near the apex of the orbit with the optic nerve running thru its center (Fig. 4). The mass was separated from all other

tumor cells surrounded the nerve and were found in the outer layers of the sheath, but did not penetrate it. Scattered thru the same section were round bodies, large enough to be seen with the naked eye; these stained deeply with hematoxylin. In the anilin blue stain, they were seen to be made up of concentric layers of a hyalin like substance, psammoma bodies.



Fig. 7. (Case A323522). Photograph showing position of the right eye five months after operation.

structures within the muscle cone and removed, including a short section of the optic nerve. The eyeball subsequently shrank and was removed some months later. Ptosis became complete and the swelling of the lids did not recede. The patient has had no recurrence of the tumor.

A microscopic diagnosis of endothelioma, (psammoma), was made. A section of the specimen contained groups of cells with small, round, or oval nuclei and abundant, finely granular cytoplasm (Fig. 5). These nests of cells were separated by bands of well developed fibrous tissue of varying width. In some places, the fibrous tissue was as abundant as the cellular areas. The cross section of the optic nerve was included in one section. The

**CASE 3 (A323522).** Miss A. M., aged thirty four years, entered the Clinic July 7, 1920, because of a mass in the right orbit behind the upper lid (Fig. 6). The first sign of swelling around the orbit occurred seven years before, and had advanced without pain. Six years before, vision began to fail in the right eye, and the failure had been gradual. Since 1916, there had been no noticeable change in the proptosis. An aspiration was attempted during the first year of the swelling, but no fluid was obtained. No history of trauma, or of serious illness could be obtained.

*Examination.*—A solid mass was found under the right upper lid, below the brow, which bulged far forward, pushing the eye downward, 10

to 12 mm., and inward. The mass was about 35 by 27 mm. The skin of the upper lid was freely movable. It extended toward the nasal side only to the superior orbital notch. The conjunctiva was not adherent, and was normal in appearance around the upper fornix. Movement of the right eye was impaired upward and laterally, not nasally or downward. There was no noticeable erosion of the orbital rim. The media of the eye were clear, the discs small, and margins blurred. There was slight proliferation of the

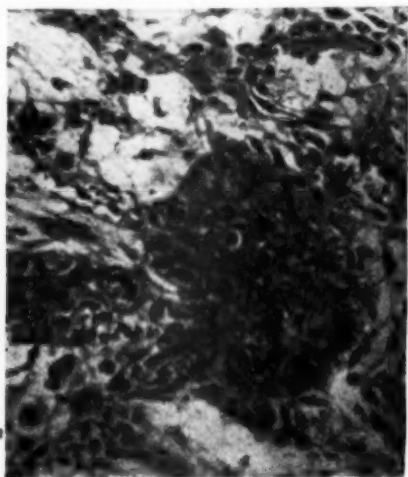


Fig. 8. (Case A323522). Section of endothelioma (x 200).

nerve fiber sheaths above and below the disc, following the course of the larger vessels. The optic cup was shallow, the lamina cribrosa was not visible; the nerve was pale pink. The fundus was otherwise normal.

*Operation.*—July 13, 1920, an incision was made thru the middle of the upper lid parallel with the brow. The tissues were divided down to the tumor, which lay outside the ocular muscle cone. The tumor, 4 by 3.5 by 3 cm., was nodular, round, smooth and completely encapsulated, with the base rather firmly attached to the sphenoidal fissure. There were no blood vessels communicating with it, except at the base of the sphenoidal fissure. On dissection, the tumor was found to be composed of a rather firm bunch of white, spongy nodules.

The gross specimen measured 35 by 28 by 20 mm. It was firm, generally oval in outline with several small nodules projecting from one pole. The tumor was definitely encapsulated, and the cut surface showed prominent fibrous trabeculae (Fig. 7).

A microscopic diagnosis of endothelioma was made. The section contained groups of rather small cells separated by a delicate network. The nuclei of these cells were oval, fairly regular in size, shape, and staining, but in general were rounder, slightly larger and lighter staining near the centers of these groups (Fig. 8). In the centers of some of the groups, the cytoplasm had an opaque, hyalin appearance and the nuclei stained faintly. In general, the cells were arranged concentrically; in some places they formed definite whorls, in others they were flattened, and lined small cavities of varying sizes, which suggested blood vessels.

CASE 4 (A369116). Mr. T. L. M., aged forty-five years, entered the Clinic August 18, 1921, because of proptosis of the right eye and pain in the head. He had first noticed pain in and over the right eye about ten months before. The pain was neuralgic in type, starting in the right eye and shooting backward on the right side of the head. Three months after the onset of pain he first noticed protrusion of the right eye; this had increased gradually. The pain had decreased during the past few weeks. The eye had been slightly inflamed at times, but only for short periods. For ten years, he had noticed deafness in the left ear with a ringing and roaring noise. He had staggered somewhat when walking, but this was thought by his relatives to be due to pain, and the bent over position he assumed. Increasing loss of memory had been noted during the last two months. Recently, he had complained of slight headache in the left occipital and left frontal region.

*Examination.*—Vision of the right eye was 6/7, of the left 6/6. The eyes were normal in shape and size, but the right eye protruded. The exophthal-



ometer readings were, right eye 24, left eye 18. There was a slight edema of the right lids but none of the conjunctiva. The right internal rectus muscle was weak, but otherwise the ocular muscles were unimpaired. The right cornea was clear, the pupil was 4 mm. in diameter and reacted normally. Intraocular tension was normal. The pupil dilated freely with cocaine, the media were clear, the disc was round, and the margins were blurred. The cup was obliterated, and slight edema of the retina was noted. There was a large retinal hemorrhage on the nasal side of the disc, extending one-half a disc diameter beyond the disc margin. There were a few punctate hemorrhages scattered over the fundus. The retinal veins were slightly engorged and tortuous. The media of the left eye were clear, the disc was round and margins were blurred. The cup was shallow with lamina cribrosa obscured. There was a fairly large retinal hemorrhage under the superior temporal vein, extending one-half disc diameter beyond the disc, and a small linear hemorrhage on the upper nasal disc margin. There was slight edema of the retina, no change in the vessels, but a few small punctate hemorrhages were scattered thruout the fundus, particularly in the temporal side. No pathologic lesions could be found in the nose or antrum, altho a slight fullness was present in the right lower lid and upper cheek. This was carefully investigated because of a previous diagnosis of malignant growth of the antrum extending into the orbit. Roentgenograms of the head were reported to be negative. The neurologic findings were indefinite. The patient was very dull; attention rapidly wandered, and he showed poor comprehension. Any test requiring cooperation was badly performed. The presence of an orbital tumor seemed evident, with a recent "slump in intelligence," which suggested invasion of the frontal lobe. In order to clear up the diagnosis, the orbit was explored.

**Operation.**—August 28, 1921, an incision was made along the superior

nasal margin of the orbit. The periosteum was elevated to the apex of the orbit on the superior and nasal sides. A boggy mass could then be palpated inside the muscle cone. The periorbita was opened on the superior surface, and the tumor found lying along the side of the optic nerve and extending from the globe backward almost to the apex of the orbit. The tumor was rather firm, movable, and could be separated from the optic nerve only with difficulty. It was about 1 by 2.5 by 2 cm.

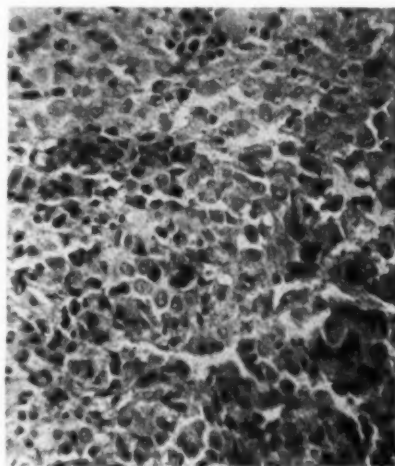


Fig. 9. (Case A369116). Section of endothelioma (x 200).

A microscopic diagnosis of endothelioma was made. The section (Fig. 9) was made up of large, lightly staining cells, with large vesicular nuclei and abundant cytoplasm. The nuclei varied greatly in size; there were numerous mitotic and many multinucleated cells. There were several large areas of round cell infiltration, and the tumor cells of these areas were degenerating and necrotic. In places, the tumor cells were arranged in cords.

The patient did not convalesce well. He showed increasing stupor, disorientation, and other signs of frontal lobe tumor. October 3, an exploratory decompression was performed, with an osteoplastic flap of the right frontoparietal area, and the tumor, which extended up into the lobe, was encountered on the under surface of the frontal

lobe. In view of the position and extent of the lesion, a radical operation was not considered advisable. The patient died January 3, 1922.

CASE 5 (A3540470.) Mr. E. F. P., aged thirty-four years, entered the Clinic, August 5, 1921, because of protrusion of the left eye of two years' duration. The vision in this eye, however, commenced to fail in 1911, and the eye had been totally blind since 1919. The day before the onset of pain, the patient had drunk some port wine, which he thinks may have con-

sive investigation for evidence of syphilis was also negative. Vision, with glasses, was 6/5 in the right eye, in the left none. There was considerable proptosis of the left eye, which was directed outward and somewhat upward, but measurements were not recorded. Movements of the left eye were limited in all directions, but particularly in the field of action of the internal rectus. No palpable mass could be found around the orbital rim. The tissues of the lids and globe were normal to external appearance. The



Fig. 10. (Case A354470). Degenerating gliomatous cyst showing the firm capsule (x 18).

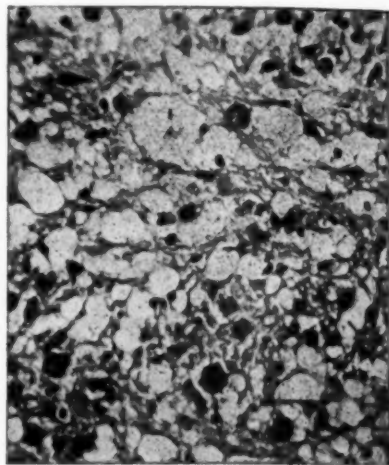


Fig. 11. (Case A354470). Central portion of degenerating gliomatous cyst (x 200).

tained wood alcohol. Pain in the orbit was increased by drinking any alcoholic beverage or by eating sour food. A "cold" seemed to make the eye protrude more than usual. The patient had been treated for toxic amblyopia and for sinusitis. In January, 1920, the vision of the right eye became blurred for three weeks, then recovered. Just before he entered the Clinic, he again had a period during which vision in the right eye was blurred. As the blurring was more noticeable for close work, he attributed it to the action of hyoscyamus in the laxative pills he was taking.

**Examination.**—General and neurologic examinations were made but failed to reveal a pathologic condition, aside from that presented in the left orbit. The right eye was normal. An exten-

sive investigation for evidence of syphilis was also negative. Vision, with glasses, was 6/5 in the right eye, in the left none. There was considerable proptosis of the left eye, which was directed outward and somewhat upward, but measurements were not recorded. Movements of the left eye were limited in all directions, but particularly in the field of action of the internal rectus. No palpable mass could be found around the orbital rim. The tissues of the lids and globe were normal to external appearance. The pupil was 6 mm. in diameter, did not react to direct light, but contracted promptly to consensual stimulation and on attempt to converge. The media were clear. The disc was oval, the long axis was vertical and pearly white, with evidence of former papilledema. There was slight exaggeration of the choroidal ring on the temporal side, the cup was obliterated, and the lamina cribrosa was not visible. The nasal side of the disc was raised and blurred. There were a number of finely tortuous vessels on the nasal portion, and on the inferior temporal quadrant of the disc. The disc was not measurably elevated over the lower part of the surrounding retina, but was raised 1 diopter in the nasal portion, above the upper temporal portion of the retina. The veins were

slightly tortuous. The inferior and nasal veins showed well-marked periphlebitis for a distance from the disc, as did also the inferior temporal, but less markedly so. There was perivascularitis along the branches of the nasal arteries, and less well marked

size of the globe, surrounding the nerve and lying mostly behind the muscle cone. As it was impossible to remove the tumor without sacrificing the eye, the eye was then enucleated and the tumor, which was the size of the globe and soft, with a degenerating



Fig. 12. (Case A399476). Photographs showing proptosis of right eye eight months after onset. Tumor removed by Krönlein operation with preservation of the globe.

perivascular changes were evident along the other veins. The choroid, in general, showed exaggeration of the interspaces and some degenerative changes in the pigment layer. This was particularly noticeable in the macular region, where there was a well defined pigment migration. A roentgenogram of the head revealed cloudiness in the left frontal sinus, but was otherwise negative.

**Operation.**—April 20, 1921, an incision was made below the brow, thru all tissues to the muscle cone. Exploration of the orbit was made with the finger and revealed a soft tumor about the

central mass, was removed. The outer portion contained a dense capsule, bluish-gray, and very firm, while the central portion was gray, soft, granular, and fragile. The optic nerve passed thru the center of the tumor. There was no connection between it and the outer walls.

The gross specimen was a round, definitely encapsulated mass about 2 cm. in diameter. The thick capsule resembled the sclera, and the mass was similar to the eyeball in size and shape. The contents of the mass were soft.

A microscopic diagnosis of glioma was made. The sections were stained

with hematoxylin and eosin, Mallory's anilin blue connective tissue stain, and Mallory's phosphotungstic acid hematoxylin. Along one side of the section was a dense connective tissue capsule (Fig. 10), which resembled the sheath of the optic nerve, with the arachnoid

anilin blue. In the meshes of this network were scattered cells, whose nuclei varied greatly in size and staining. Some were very small, others fairly large, and the intensity of the stain seemed to have no definite relation to the size (Fig. 11). There were a few cells which appeared to be multinucleated, probably phagocytic endothelial leucocytes. The tissue had a vacuolated appearance (like liver in fatty infiltration), and in some places there were larger spaces partially filled with clear, light staining material. No evidence of tumor was found in a section of the eyeball.

CASE 6 (A399476). A.B., a girl, aged seven years, was examined at the Clinic July 27, 1922, because of marked protrusion of the right eye (Fig. 12). This was first noticed in December, 1921. Considerable proptosis appeared in a single night, unaccompanied by pain, and complete blindness in the eye ensued within a few days. The

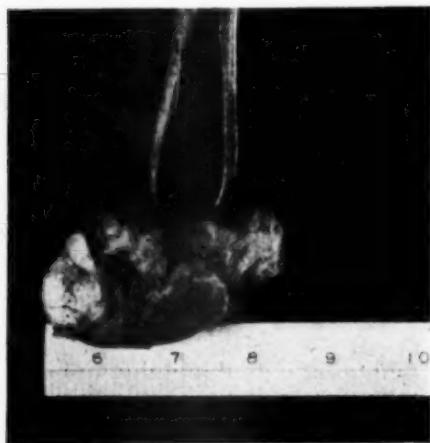


Fig. 13A



Fig. 13B

Fig. 13. (Case A399476). (a and b) Photograph showing the size of the tumor. The end grasped by the forceps was the nearest the globe. Note the optic nerve protruding from the tumor.

and pial layers exaggerated in places. Beneath this, were numerous large blood vessels and slight infiltration of the tissue with blood corpuscles. In this area, were numerous phagocytic cells distended with brownish granules, and blood pigment (rare in a tumor of this kind). The main part of the section was made up of a network of coarse and fine fibrils, which stained deeply with phosphotungstic acid hematoxylin, but did not stain with the

proptosis reached its height within a month, and for six months had remained about stationary.

*Examination.*—The general physical examination was negative, and all tests for syphilis were negative. There was no vision in the right eye; in the left it was 6/10. The right eye was directed slightly outward and downward. Upward rotation was limited; the eye could be raised only slightly above the primary position; otherwise



rotation was good. The eye could not be pushed back into the orbit, and no mass could be palpated around the rim of the orbit. The media were clear, the disc was round, and the margins were well defined and very pale. There was no loss of nerve substance; the lamina cribrosa was not visible. Otherwise the fundus findings were negative in both eyes.

**Operation.** (Krönlein).—July 31, 1922, a soft mass could be felt thru the

ish, smooth, and pear shaped (Fig. 13a). It was fairly firm, but fluctuated slightly. The posterior end, which lay in the apex of the orbit, was 6 by 7 mm. About 7 mm. from the anterior pole was a depression, on the under surface of which rose the stalk, which was attached to the posterior pole of the eyeball, probably the optic nerve (Fig. 13b). With the exception of this depression and the cut posterior end, the mass was covered by a smooth cap-



Fig. 14. (Case A399476). Glioma of optic nerve showing the end of the nerve nearest the globe (x 3).

periorbita behind the globe. The periorbita was incised above the external rectus, which was depressed without being cut. Tenon's capsule was opened over the tumor, parallel with the course of the optic nerve, and the encapsulated tumor found to extend from the apex of the orbit to the globe, tapering at both ends. The greatest diameter of the tumor was about 12 mm. behind the globe. The nerve was cut immediately behind the globe, and at the apex of the orbit, after the tumor had been freed. There were no fibrous adhesions except near the anterior end. The tumor 32 by 18 by 17 mm., was smooth and rather soft, white, and practically bloodless within; on removal very little hemorrhage occurred. Recovery was rapid and uncomplicated. The eye, was retained with good movement and normal appearance.

The gross specimen was pale, pink-

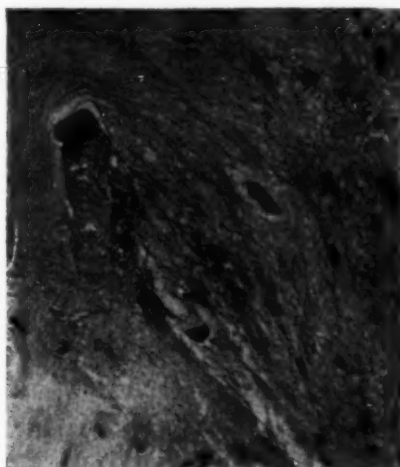


Fig. 15. (Case A399476). Glioma of optic nerve showing the invasion of the optic nerve (x 200).

sule. A longitudinal section of the tumor was made in the vertical plane, thru the optic nerve. The capsule, which is 0.5 to 1 mm. thick, was attached only by a few fine threads, and was wrinkled as tho it had been distended by fluid. Along the lower border of the mass was a band 5 mm. wide, which was continuous on the anterior surface with the optic nerve in the depression on the under side. The anterior half of this band was free; from the upper margin of the posterior half, there apparently arose the main tumor. The entire cut section was firm, white or yellowish, and appeared to be composed of the same tissue.

A microscopic diagnosis of glioma of the optic nerve was made. Sections were stained with hematoxylin and eosin, Van Gieson's and Bielschowsky's silver stain. The dural, arachnoid and pial layers of the optic nerve

sheath were clearly seen on the lower edge of the section, but the two latter were absent or inconspicuous above (Fig. 14). The anterior free end of the band along the lower border, previously described, was undoubtedly optic nerve, but it very soon changed char-

except a few coarser ones around the blood vessels; they stained beautifully with silver. The nuclei varied considerably in size and staining reaction, and mitotic figures seemed to be present. The proportion of cells to fibers varied; and, in general, the more



Fig. 16. (Case A382408). Photograph showing proptosis of left eye twelve months after onset. Tumor removed by direct frontal route.

acter and resembled the remainder of the section. There was rather a rapid transition from nerve tissue to tumor tissue. The course of the nerve thru the tumor could be surmised by the parallel arrangement of the connective tissue septums. The entire section was made up of a fine network of fibers, in which were numerous cells with oval nuclei (Fig. 15). The fibers did not stain red with Van Gieson's stain,

numerous the cells, the larger the nuclei. Much of the tissue was distinctly vacuolated, and in one place, where the cells were smaller and more regular, they were arranged around these vacuoles as tho lining them. There may have been one or several layers of nuclei. Often the vacuoles apparently coalesced to form larger spaces which contained clear material.

CASE 7 (A382408). Mrs. G., aged

thirty years, came to the Clinic January 24, 1922, because of failing vision and increasing exophthalmos of the left eye (Fig. 16). In September, 1920, she had an acute swelling of the left upper jaw with infection around her left upper wisdom tooth. The left side of the face was swollen, the left eye had protruded, and caused severe shooting pains. An attempt was made to extract the tooth and establish

touch. There was also a tender spot in the top of the head.

*Examination.*—Vision in the right eye was 6/5, in the left 1/60. The lids closed and opened normally. There was proptosis of the left eye, the exophthalmometer reading was 16 in the right eye and 23 in the left eye, the intraocular tension was estimated by palpation to be normal. The external examination was otherwise negative. The pupils were equal and reacted normally. The ocular movements were not impaired. The fundus of the right eye was normal. In the left eye there was an edematous swelling of the nervehead reaching 2 diopters, without hemorrhage or exudate. The details of the disc were obscured by the swelling; the arteries were not affected, but the veins showed moderate distention and tortuosity. The periphery of the fundus was normal. A roentgenogram of the head showed the paranasal sinuses to be greatly enlarged. The nose contained a quantity of pus streaming from the right ethmoidal region. The left side did not contain pus. Antrum puncture on the left side was negative. Exploration of the anterior ethmoids on the left, and probing into the left frontal sinus failed to demonstrate lesions.

*Operation.*—February 7, 1922, brow incision as for a Killian operation was made, and the roof of the orbit explored. Thru the periorbital, back of the globe, a soft mass could be palpated, which appeared to be about 1 by 2 cm. This was lying between the periorbital above the optic nerve on the mesial side and the muscle cone on the temporal side. On being freed from its adhesions, there was a gush of clear fluid containing yellow and white flocculent bodies. The sac was then found to extend to the orbital foramen where it was tied off by catgut and the accessible portion removed.

The gross specimen presented the collapsed wall of a cyst, which was probably 25 by 15 mm. when distended. The wall was tough but not very thick, and it appeared to be made up of white fibrous tissue.

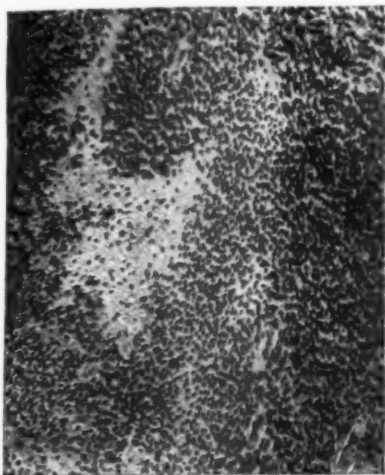


Fig. 17. (Case A382408). Degenerating gliomatous cyst (x 100).

drainage, but the roots were broken off and left in place. Within a week the eye receded considerably, but remained noticeably prominent. It had pained occasionally, but not so severely as at the onset of the swelling. In January, 1922, she noticed that vision in the left eye was not so good as it had been. The roots of the broken tooth were removed, three other teeth were extracted, and tonsillectomy was performed. She was also given electrical treatments. These operations, however, had no effect on the eye or the vision. She still suffered slight pain "in the sun in the early morning or late evening." During the week preceding her first examination at the Clinic, the pain in the eye had become infrequent and mild, but she had frontal headache and a dull aching sensation in the right eye. Pain seemed to radiate to a spot on the right temple that was sore to

Microscopic diagnosis of glioma was made. Section showed an oval, cellular mass about 4 by 5 mm. It consisted of parallel rows of closely packed, small, spindle-shaped nuclei surrounding groups of smaller round or oval nuclei (probably the same type cut at different angles) (Fig. 17). There was a moderate amount of lighter staining material, made up of closely packed, fine fibers, which were abundant in spots and separated the nuclei widely. The nuclei were fairly uniform in size, and staining; no mitotic figures were seen.

CASE 8 (A350846). R. S., a boy, aged eight years, entered the Clinic February 26, 1921, complaining of diplopia and protrusion of the left eye. Diplopia first appeared about two months before, and he was given glasses. No other trouble was noticed at that time. One month later, the parents noticed that the left eye was becoming more prominent. The local physician kept him under observation for one month, then referred him to the Clinic for further examination and treatment.

The patient was an only child, was delivered with instruments, and at birth weighed 9 3/4 pounds. A thin, linear scar running along the left temple, by the outer canthus, over onto the malar prominence, showed the injury that had resulted from the use of forceps. The child was robust, and had been in good health since birth. He had had no headache, and with the diplopia and exophthalmos, had only occasional stinging pains in the orbit and shooting pains over the head. He had vomited several times in one day, five weeks before, but the vomiting was not projectile and was associated with fever.

*Examination.*—The right eye was normal in shape and position and rotated to normal limits. The left eye showed marked proptosis and was rotated upward till the lower margin of the cornea appeared in the middle of the interpalpebral zone. There was complete paralysis of all the depressors of

the left eye and weakness of the left external rectus. The lids were not swollen, but the conjunctival vessels were dilated and tortuous. The cornea was clear. The pupils were equal and normal in size, shape, and position, and reacted normally to light stimulation. Deep palpation around the margin of the orbit failed to reveal a definite mass. The globe could not be pushed back into the orbit. Ophthalmoscopic examination showed the media to be clear. There was a papilledema of 6 diopters, with some swelling of the retina, but no large hemorrhages or exudate. A roentgenogram of the left orbit was reported to be negative. Ears, nose and throat were normal.

*Operation.*—March 2, 1921, the orbit was opened by Krönlein's method under general anesthesia. A tumor was found in the depth of the orbit, extending forward almost as far as the lower lid, involving the muscle cone and in contact with the optic nerve. At the apex of the orbit, the nerve was surrounded by a soft mass. The tumor was not definitely encapsulated, only slightly vascular, and quite friable. It was removed piecemeal.

A frozen section made at the time was reported by the pathologist as probably sarcomatous, and a subtotal exenteration of the orbit was performed. Radium was applied as follows: March 3, 1921, 1800 mg. hours; March 24, 1000 mg. hours; July 1, 2200 mg. hours; and September 17, 1020 mg. hours. With the exception of a small amount applied in the center of the orbit, the radium was applied over the left temporal region, screened by 2 mm. of lead and 2.5 cm. of wood. The orbit has since become epithelialized, and one year later there was no sign of recurrence.

The gross specimen was a funnel shaped mass about the size to fit into the orbit, and was composed of fatty tissue and firmer nodules. At the apex of the funnel was a round open-



## SUMMARY OF CASES

Case	Orbit	Vision in Affected Eye	Proptosis	Duration of Proptosis	Lateral Displacement	Restriction of Ocular Movements	Fundus	Operation	Pathologic Diagnosis	Results
A366379	Left	6/5	8 mm.	Nine months	.....	None	Negative	Direct frontal	Endothelioma	Brain tumor.
A311349	Left	6/30, failing seven years	9 mm.	Six years	.....	Out, up, down	Papilledema, 2 diopters	Krönlein	Endothelioma, psammoma	Eye removed eight months later
A323522	Right	6/30, failing six years	.....	Seven years	In, down 12 mm.	Out, up	Slight pallor of disc	Direct frontal	Endothelioma	Good
A396116	Right	6/7, failing ten months	.....	Ten months	Out, 6 mm.	In	Papilledema, 1 diopter, retinal hemorrhages	Direct frontal	Endothelioma	Brain tumor. Died five months later
A354470	Left	None, eight years	6 mm.	Two years	Out, up	In out, up, down	Postneuritic atrophy	Enucleation and removal of tumor	Glioma	Good
A399476	Right	None, eight months	8 mm.	Eight months	Down 1 cm.	None	Simple atrophy	Krönlein, with preservation of globe	Glioma	Good
A382408	Left	1/60, twelve months	7 mm.	Twelve months	.....	None	Papilledema, 2 diopters	Direct frontal	Glioma	Good
A350846	Left	6/60, two months	.....	Two months	Out, up 7 mm.	Out, down	Papilledema, 6 diopters	Krönlein evisceration	Neurocytoma	Good

ing, thru which the optic nerve probably passed. The globe, with 8 mm. of optic nerve, was preserved separately.

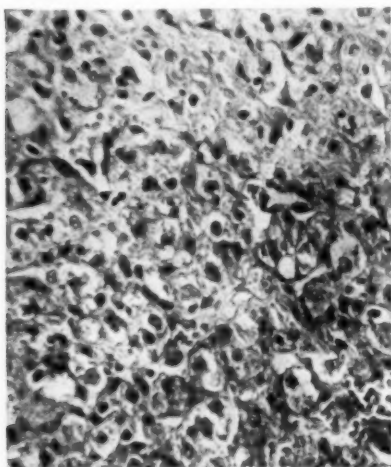


Fig. 18. (Case A350846). Section of neurocytoma (x 200).

A microscopic diagnosis of neurocytoma, probably neuroblastoma, was made. Sections were stained with toluidin blue, Van Gieson, hematoxylin and eosin, Mallory's anilin blue, Mallory's phosphotungstic acid hematoxylin and Bielschowsky's silver stain. The sections were very cellular and contained very little stroma (Fig. 18). The most conspicuous cells had large, light staining oval nuclei with a deeply staining nucleolus in each. Toluidin blue did not demonstrate Nissl bodies. In the silver stain, an occasional cell with processes could be seen. Between the cells were fine fibers, which tended to a concentric arrangement with respect to the cells; this made the section appear as though it were made up of numerous small round units. The child was alive and well eighteen months after the operation.

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## INTRACAPSULAR CATARACT EXTRACTION WITH THE ERISIPHAKE.

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This paper gives a brief description of the operation practised and the results obtained by Prof. Barraquer during his visit to Philadelphia. It also gives a critical estimate of the value of this operation for ophthalmic surgeons in general. Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, Oct. 19, 1922. (See p. 232.)

Last fall I had the honor, by request, of presenting before this Section an analysis (criticism) of the intracapsular operation as performed by Lieut. Col. Smith at Wills Hospital. Tonight, at the request of the Chairman of the Section, I shall do the same by the operation of intracapsular cataract extraction as performed by Prof. Ignacio Barraquer with the erisiphake.

As the instrument and method of procedure are of comparatively recent introduction, it will not be out of place to briefly describe each. According to the description published by its maker, the apparatus consists of two essential features: the erisiphake proper or cupping canula, and the pneumatic machine for producing the vibratory vacuum. The erisiphake consists of a white metal holder to which is adjusted a platinum cup. It is furnished with a set of valves operated by a button, by means of which communication with the vacuum producer can be established or interrupted at will for the purpose of altering the pressure. It is claimed that not only is the lens seized by the cup, but that the fibers of the zonule are ruptured by means of vibrations transmitted to the lens when the air within the cup becomes rarefied. The vacuum is produced by a so-called pneumatic vibratory vacuum machine, which is operated by an electric motor.

*Preparation of the patient:* For two hours before the operation, at intervals of ten minutes, a few drops of solution of—

Euphthalmin chlorid 0.25 grm. (gr. iv.). Cocain hydrochlorid 0.25 grm. (gr. iv.). Adrenalin Sol. (1-1000) 3 cc. (m. xlv.) Sod. chlorid Sol. (6-1000) 3 cc. (m. xlv.) are instilled into the eye. In selected cases a 1% solution of novocain is injected along the fibers of

the facial nerve to secure temporary paralysis of the orbicularis muscle.

### THE OPERATION.

The assistant, to the right of the surgeon, raises the upper eyelid by means of a Desmarres elevator and raises the eyebrow with the little finger. With the other hand he holds the lower lid, while the surgeon fixes the globe with a Landolt forceps below the cornea. The incision includes  $\frac{2}{5}$  of the circumference of the cornea, and follows the limbus thruout. A small conjunctival flap may be made. While the flap is being made, the eyeball must not be deformed or displaced. In patients who threaten to be troublesome, a corneal suture is introduced. An iridectomy, preferably an incomplete basal one, may be made; but by preference none is made.

During extraction, the lower lid is drawn away from the globe and pressed against the cheek bone. The surgeon lifts forward the upper eyelid by means of a Desmarres elevator held in his left hand. The patient is directed to look downward. The cup of the erisiphake is now introduced into the anterior chamber from the temporal side of the wound in case of the right eye, and the nasal side in case of the left eye, as far as the center of the pupil, or still lower, behind the iris, sliding over the capsule without pressure upon the lens. The vacuum is now formed by pressing the button with the thumb. The rarefaction is said to take place by jerks, thus creating sufficient vibration to rupture the zonule, this being aided by the diminution in the diameter of the lens, resulting from the partial protrusion of its mass into the cup. The degree of vacuum necessary to bring about this result varies from 50 to 70 cm. Hg.



In case of a combined operation, the lens is removed by pulling forward the upper rim in such a manner that the lower side of the lens follows the curve of the patella fossa, keeping in contact with it and being guided to the side of the flap opposite to that at which the instrument was introduced, the rear surface being kept in contact with the scleral lip. When no iridectomy, or only a peripheral button hole iridectomy is made, the lens is first lifted straight up 1 mm. The lower margin of the lens which touches the posterior surface of the iris now becomes uppermost, the posterior surface of the lens being in contact with the posterior surface of the cornea. The extraction is completed as in the combined operation. If an iridectomy has been made, the edges of the iris are replaced. In the other method 0.5% eserine ointment is introduced into the conjunctival sac. The lids are gently closed, the palpebral fissure is covered with bichlorid ointment, 1-3000, a single layer of gauze, 4 x 5 cm., is moulded into the

eyelids and moistened with salt solution, the hollows of the orbits are filled up to the level of the eyebrows by small flecks of cotton. The whole is then covered with gauze, shaped like eyeglasses and fastened with adhesive plaster. The dressing must not extend beyond the limits of the orbits.

The number of operations here presented is too small from which to draw conclusions. The visual results are not equal to those obtained by an operator of far less experience and dexterity operating by the extracapsular method. The absence, in this series, of complications so frequent in the expression method of intracapsular extraction, is probably due more to the skill of the operator than to the safety of the method.

The utility of an operative procedure must be estimated, not by the technic and results of its most skillful interpreter, but by those likely to be attained by the surgeon of average ability. Any method of operating that requires a skill and experience not to be

Service of	Age	Sex	Eye	Delivered	Reaction	Iris Prolapse	Loss of Vitreous	Refraction and V
1. Chance .....	70	M.	O.S.	Intra-capsular Capsule ruptured	Slight	No	No	+11 6/12
2. Griscom <sup>2</sup> ....	77	M.	O.D.	Intra-capsular	Iridocyclitis Slight	No	No	Not recorded +9.5=+4 ax. 180°
3. Parker .....	73	F.	O.D.	Intra-capsular	Slight	No	No	+11 6/15
4. Holloway <sup>1</sup> ...	77	F.	O.D.	Intra-capsular	Moderate	No	No	+7=+1.75ax180° 6/9
5. Holloway ....	61	M.	O.D.	Intra-capsular	Slight	No	No	+12=+2 ax180° 6/9
6. Holloway ....	72	M.	O.D.	Intra-capsular (Prel. Irid.) Capsule ruptured	Slight	No	No	Not recorded 6/60
7. Radcliffe ....	78	M.	O.S.	By spoon not intracaps.	Moderate	No	No	+10=+3 ax15° 6/15
8. Radcliffe <sup>2</sup> ...	74	M.	O.S.	Intra-capsular	Slight	No	No	10/10/22 +10 6/9 pt.
9. Hansell .....	?	M.	O.D.	Intra-capsular	Iridocyclitis	No	No	Not recorded 6/6 pt.
10. Peter .....	65	F.	O.D.	Intra-capsular				

1. Striate Keratitis. First dressing, Aqueous filtered beneath conjunctiva. Probably Endophthalmitis Phacolytic, as other eye had similar reaction following combined extraction. (Clark, C. S.)  
 2. and 3. Patient squeezed. Lens dislocated into vitreous capsule. Capsulotomy forty-six days later. Infection: marked iridocyclitis; pupil occluded by membrane. Good L. P.  
 (I am indebted to C. S. Clark for the compilation of the above table, and to H. F. Hansell and L. C. Peter for leave to report their cases.)

## SUMMARY.

Vitreous loss	Iris prolapse	Severe reaction resulting in occlusion of the pupil	Failure to deliver in capsule
None	None	One (Severe reaction. Pupil not occluded.)	Three

Vision—6/6 One, 6/9 Three, 6/12 One, 6/15 Two, 6/60 One, Not recorded One, Probable hand movements One.

reached by an average operator cannot be recommended. This is true of the method promulgated by Barraquer, and also that by Smith. Granted that intracapsular extraction gives visual results so far superior to those obtained by extraction of the lens without its capsule, that there is justification for assuming certain risks, methods which expose the eye to these risks and yet attain this desired result in only 70% (Barraquer) should not be approved. In unskillful hands the Smith operation would appear to be the safer, as loss of vitreous is the one serious danger, whereas, in the Barraquer operation there is the added danger of serious injury to the iris or loss of the entire contents of the globe. In skilled hands the Barraquer method appears safer, as in comparing the accidents and complications in these two

short series, we find that Smith had 38 per cent of vitreous loss, Barraquer none; Smith had 38 per cent of iris prolapse, Barraquer none.

If an intracapsular operation is desirable, it would seem to the writer that a method which avoids undue pressure on the hyaloid, with its consequent danger of loss of vitreous and the danger resulting from the production of a vacuum within the eyeball, should be the method of choice. Such we have in the Stanculeanu forceps method, or in one of its modifications, particularly that of Knapp.

After all, the combined extraction, or extraction after preliminary iridectomy, give in the end, results which compare favorably with any of the other methods proposed, and surpass them in ease of acquiring a safe technic.

### SOME PRACTICAL POINTS IN REFRACTION.

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The best methods for the study and correction of ametropia, as judged by 35 years of practice, are here given. Essentials are plenty of time, careful determination of the static refraction with cycloplegia, repeated until the results on succeeding days agree. A post-cycloplegic test and measurement of accommodation. As a rule reexamination after two or three years is best. Read before the American Academy of Ophthalmology and Otolaryngology, September, 1922.

Notwithstanding accumulated knowledge of theory and method, good refraction is by no means general. No proof of this statement will be asked by the older men, who are seeing much referred work. As at least 80% of our work is the measurement of ametropia, this statement stands as an indictment of our specialty. I think we may wisely consider some of the reasons for our failure to do better refraction and discuss remedies.

First among reasons, I would place the lack of adequate opportunity for thoro training in this country. We have a few, very few high grade post-graduate schools where good work is being done; we have more very poor schools, where after a few weeks men are given a certificate so stating, and who seem to believe, that they are

qualified to practice ophthalmology and oto-laryngology. Another reason is undoubtedly a lack of interest in the less spectacular part of our work, and an impatience with what is regarded by some as the drudgery of ophthalmology.

Some men, either from lack of interest, lack of imagination or something else, seem to have no conception of what a good refraction means. They never become interested in the refinements of the work, and as soon as possible relegate it to an assistant, who has no greater interest and perhaps less ability. I have some friends, a large part of whose refraction is done by lay assistants.

For thirty-five years, my best energies and most of my working hours have been devoted to the study and

correction of ametropia, and the conservation of vision. I regard it as the most important work I do and love it. Naturally, I am seeing a good many patients who have not found relief, and my feeling is that most of the failures which I see are due to a lack of a rational method of procedure.

I do not presume to instruct those who have grown grey in ophthalmology. Please allow me to address myself to those younger men who may not as yet have acquired a habit of work. They will pardon me, I know, if some of the things which I shall call attention to seem very elementary and selfevident. I believe, however, that I can best explain what seems to me a "rational routine" by describing my own methods.

I do all my refraction by appointment, and insist upon adequate time to do it in my own way. I make the preliminary examination and take the history myself. In a carefully taken history and survey of the patient's general condition, will often be found the key to previous failure and valuable indications for special procedure. Some headaches, for example, may be due to eyestrain alone, but more are probably due to a combination of causes; a chronic blepharitis may be relieved by carefully selected lenses, but there may be in any case other conditions which must be regarded as contributory causes and cleared up before relief is secured. If the patient who comes for glasses for the improvement of his vision has gained thirty pounds in a few months, and has lost his sexual power, one will be inclined to study his nerveheads carefully and take his fields. Such a history need not take long, and the questions will be suggested by the complaint of the patient; his appearance, age, etc. Only the essential facts brought out need be noted in one's record.

After taking the history, it is my custom to inspect and carefully note the appearance of the external eye and its appendages, the iris, the anterior chamber, pupillary reflexes, the excursions of the globes and the tension to

the fingers. The vision is taken and the fundus examined thru the small pupil. I never make a manifest refraction before using drops, and I always use drops at all ages. I have not the skill of some in the use of the ophthalmoscope, and have never been able to make a satisfactory examination of the lens, vitreous and eyegrounds thru the small pupil. Even in suspected and known glaucoma, I have not hesitated to use cocain as a mydriatic, and have no cause to regret it. Of course, I always use eserine after the examination is over, and have the patient wait until the pupils have resumed the normal size. In elderly patients who have lost practically all of their accommodation, I use euphthalmin and cocain, 1% of each, and if these drugs do not dilate a rigid pupil, I use homatropin and cocain.

The prime essential in fitting glasses is a knowledge of the static refraction, which I do not believe we can determine without cycloplegia. I use atropin in the examination of all children, and of young adults who can give the time for it, especially if they have not found relief from glasses prescribed under homatropin. I have frequently used atropin up to forty in such cases, particularly when prolonged rest seemed desirable, tho I am seeing such cases less frequently than formerly.

For thirty years I have followed one plan in the use of atropin. I prescribe a 1% solution, and direct that two drops be instilled in each eye three times a day until ordered discontinued. The patient is to lie down, or to have the head tilted well back, and the lower lid held away from the globe by pressure against the malar bone; one drop is put in one eye and the lid held firmly for twenty seconds; then a drop is put in the second eye, and the application repeated after two minutes. In very young or delicate children, only one drop is used in each eye. After the drops have been used one day or three or four times, I make a careful fundus examination and use the ophthalmometer; my assistant does a retinos-

copy, and after the patient has rested with the eyes closed for ten or fifteen minutes, I make the subjective test. The drops are continued and the subjective test is repeated daily until the results are the same on two succeeding days. The advantages of the method are obvious. The patient gains from day to day in knowledge of what we want and how to help, his interest and observation are stimulated, until finally the results cannot be changed. As a rule three tests are made on succeeding days, occasionally four in a new or difficult case. In prescribing, I usually cut the sphere from 0.50 D. to 1.00 D. in hyperopia, except in cases of squint or high esophoria, when I give full correction. In myopia I always order the full correction, except in a few cases of very high myopia, when a patient sees just as well and more comfortably at the distance, with both eyes open, with less. The glasses are to be put on at once and worn constantly. Patients are always asked to report in a week or ten days, that I may say when the eyes may be used, and again in two or three weeks. If at this second visit the hyperopes are found to be overcorrected, the sphere is reduced until they get their best vision. Children are naturally more adaptable than adults, and the stage of adjustment is usually passed by the time the effect of the atropin is gone.

The question often arises: "How much of the time shall active boys and girls wear their glasses?" Of course, this depends largely upon the amount and nature of the defect, the symptoms complained of, the general health and the probable relation of the eyestrain to the general condition. Generally speaking, glasses should not interfere with the normal activities of the child when out of doors, but should be worn constantly when in school and for all near work when at home, and also at the movies. In myopia we must be more strict, and I believe the glasses should be worn as much of the time as possible. Children should be provided with two pairs of glasses, in order that at least one pair will always

be in perfect order, and they should report frequently to us or to the optician for adjustment. We all know that the only way to get the full effect of a lens is by looking thru its optical center at right angles to its plane, and that our most careful work may be undone if the patient does not wear his cylinders as we have intended to have them placed. I am almost daily seeing patients who are in need of the most careful correction, whose attention has never been called to these facts, and whose glasses are in consequence seldom in perfect adjustment and do not give the relief looked for. Many of the newer frames made to hold circular lenses have no device to prevent turning of the lenses in the mounting. Such lenses should always be marked and examined from time to time to see that the axes remain where they should be.

Naturally, most of my patients are refracted under homatropin. After the preliminary examination, already described, the patient sits in a semidark room, and from three to six applications of a solution containing 2% of homatropin and 1% of cocain are made to each eye, care being taken that time is given for the cornea to become bathed in the solution before the lower lid is released. An hour and a quarter after the first application, I make the intraocular examination, and use the ophthalmometer. My assistant does the retinoscopy. The patient rests with his eyes closed until I am ready to make the subjective test. I believe the ophthalmometer is worth while and employ it as a routine; carefully used, it gives us information too valuable to be ignored, and in some cases, where accurate retinoscopy is impossible because of cloudy cornea or lens, it is a very important help.

My consulting room is lighted from above by the indirect method. The shades are drawn during a refraction, and there are no disturbing side lights. The test cards are of black with white letters. They are hung on a black wall and illuminated perfectly and uniformly from the side. There is no direct



reflex from the cards or the letters. I use a phoroptometer, which is carefully adjusted from time to time in order to secure perfect centering of the lenses, and the patient is urged to make himself perfectly comfortable in the chair before the examination begins. Unless results are obtained very quickly, he is asked to rest his eyes frequently during the examination by closing them. I use an astigmatic chart, the old one with twelve spokes with three lines in each, and each spoke pointing to an hour of the clock. I would not be without it. If I do not get 6/5 quickly, especially if I have noted in the dark room that the refraction of the center of the cornea seems different from that of the cornea as a whole, I use the 3 mm. diaphragm. In refining my tests at the last, I have found Dr. Jackson's crossed cylinders of great help. If the patient is uncertain and inconstant in his answers, I immediately add a +3.00 D. lens to the correction so far determined, and test his accommodation as suggested by Dr. Duane; if more than 1.50 D. remains, I have more homatropin used and have him wait half an hour and try again, or if it seems best I omit the usual application of eserine and have him come again the next morning for a second examination under homatropin. I use homatropin in adult patients at any age while much of any accommodation remains, and agree with Duane that the most important time is after 40. I seldom find it necessary after 55, and seldom use more than three drops in each eye after 48. I recall one patient, a physician, who at 66 was not made comfortable until I corrected under homatropin an astigmatism of +0.50 D., which was not manifest before. After completing the examination under homatropin or euphthalmin and cocain, I use eserine salicylat in 1/5% solution, making one, two or three applications at intervals of five minutes, and frequently having the patient wait until the pupils begin to go down. If the eserine causes distress, a hot towel usually gives relief. A drop of cocain will also help.

I am not unmindful of the possible danger of precipitating glaucoma, in patients predisposed, by the use of mydriatics. In an experience covering thirty-five years and many thousands of cases, I have had one case in which tension went up while the patient was in my office, and before eserine had been used. This was a patient on whom I would not now use homatropin: a Jewess, fifty years old, with rather shallow anterior chamber and beginning arteriosclerosis. Tension was easily controlled with eserine. I have seen her from time to time for several years, and she has not developed glaucoma. In another case, glaucoma developed after an examination under homatropin, but an acute influenza intervened. I had no opportunity to see the patient for twelve days, and I have never felt sure that the mydriatic had anything to do with the glaucoma. Unfortunately, this patient became blind. As Duane says: "An eye which develops glaucoma under a cycloplegic is going to develop glaucoma anyhow. It is not an unmixed evil to have it develop under our eyes." I always make a postmydriatic test, after an examination under homatropin and cocain or euphthalmin and cocain and, using eserine as I do, I can make the second test after homatropin in two days. Probably the ideal thing would be to have the patient rest his eyes from all near work and come for the final test in four or five days, but this is not practical. Occasionally, it is necessary to cut a plus sphere prescribed in this way, but not often.

I make the postcycloplegic test by having the patient close his eyes, while I arrange before him the full correction as found under the drops. I then ask him to look at the letters and to read what he can. I then cover one eye and reduce the plus sphere or increase the minus one, until he gets his best vision and a perfect wheel if that is possible. Occasionally, it is necessary to cut a plus cylinder or increase slightly a minus one, or even to change the axis of a cylinder, in order to secure the best vision the pa-

tient is capable of. I know this is contrary to the practice of some good men, but it works, and I often think of a remark of De Wecker: "The best glass is not always the one which science dictates, but the one the patient accepts." After settling the matter of the distance glass, I test the muscle balance with the Maddox rod and note the result. Moderate errors are ignored for the time, unless the patient has not been relieved by a complete correction for his ametropia. I have seen as much as  $4^{\circ}$  of hyperphoria disappear in a short time with the use of a good correction, and have many patients with  $8^{\circ}$  or  $10^{\circ}$  of esophoria or exophoria, who do not know they have it. If hyperphoria or esophoria persist and are troublesome, I partially correct them by the use of prisms for constant wear. In exophoria due to convergence insufficiency, I often give relief with prism exercises. In divergence excess, I prescribe prisms or do a tenotomy, but I do very few tenotomies. After making the test with the Maddox rod, I test the accommodation—not in the exact way that Dr. Duane has used in his studies, but by the use of the sliding card of near types, on the rule of my optometer. I did not know until I adopted this plan, how many cases of subnormal accommodation I was overlooking, or in how many presbyopes the accommodation was not the same in both eyes. In ordering the reading correction in presbyopia and subnormal accommodation, I strive to give my patient a range of 25 to 50 cm. (10 to 20 inches), unless he is a very tall man or one who prefers a more remote range. For cards and music, for bench work and some other things, a second correction is best, which will give a range of 50 to 75 cm. I always test the eyes separately, and often prescribe lenses which differ by 0.25 or 0.50 D. Dr. Duane's researches in accommodation have been of great practical value to me, but chiefly in impressing the fact that we must individualize. We can not prescribe

glasses by rule of thumb. Each case must involve a study of the individual as well as the eyes. The general health, the sensitiveness and reaction to strain of all kinds, the amount and kind of eye work done, must always be taken into account. We must realize that an astigmatism of 0.25 D. may be a cause of great discomfort in some cases, while in others 1.00 D. may cause no symptoms. Any measurable defect should be corrected if it causes strain. It is my habit to ask all patients to report in a week, and again in a month after examination, in order that I know the result of my work and make any readjustments necessary. My experience has convinced me that slight but real changes in refraction are occurring in many, if not most eyes, and I therefore advise all patients to come in once a year to be checked up. As a rule, I find sufficient change in two or three years to warrant reexamination, and in a few cases oftener. In closing this paper, I can not do better than to quote the ending of a paper on the same subject by Dr. Duane: "I think the whole matter of handling refraction cases may be summed up in these two maxims:

First, let us find out all we can about the eyes we are treating and the symptoms of which they are a part; using to this end every means that experience has proved to be helpful, never doing the work in a hurry, and remembering always that this work of all others requires patience, thoroughness, and accuracy.

Second, let us constantly bear in mind the fact that we are treating patients, not eyes; that we are handling human beings, not machines; and that we cannot do our best work unless in each case we put ourselves in touch with the individual man before us, showing sympathy for his troubles, consideration for his infirmities, and an understanding mind, to take in all the physical and mental factors which may affect his outlook on life, and determine his need for refractive or other correction."

## A PLEA FOR THE MORE GENERAL USE OF THE CROSS CYLINDER.

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It is here urged that the use of the cross cylinder should be more generally and better understood. The method and effects of changing the direction of its principal meridians are described and illustrated. Read before the American Academy of Ophthalmology and Oto-Laryngology, September, 1922.

The correction of astigmatism enters into the majority of cases of refraction, and a careful refractionist spends by far the greater part of his time in estimating the strength and axis of astigmatic correction required.

Altho the various astigmatic dials are as a rule fairly accurate for the estimation of the strength of astigmatic correction, once the axis is determined, there are unfortunately a goodly percentage of cases in which these dials are very unreliable. And in a very much greater percentage of cases, none of the commoner methods of estimating the astigmatic axis are sufficiently prompt or reliable for refined work.

There is, however, a simple piece of apparatus with which a close approximation to the strength of cylinder required can usually be obtained where the astigmatic dial fails; and with this same simple piece of apparatus, it is almost always possible to ascertain with great accuracy the axis required. I refer to the cross or crossed cylinder.

The cross\* cylinder test for strength of astigmatism was first described by Dr. Jackson 35 years ago. The application of the same device for the determination of the axis was suggested by Dr. Jackson 15 years ago. Yet it is safe to say that relatively few refractionists are familiar with either method. This is especially true concerning the axis test, which in my opinion is much the more valuable and more uniformly reliable of the two.

For some reason the cross cylinder tests seem to have received insufficient publicity. By the majority of students, undergraduate or postgraduate, they are not readily appreciated without optical demonstration of some

kind. In periodic literature, they have apparently been dealt with on three occasions only, twice in short papers by Dr. Jackson<sup>1</sup> and once in a paper by Dr. Schneideman<sup>2</sup>. These three papers contain only one illustration.

Those of us who thru personal contact with Dr. Jackson or in other ways

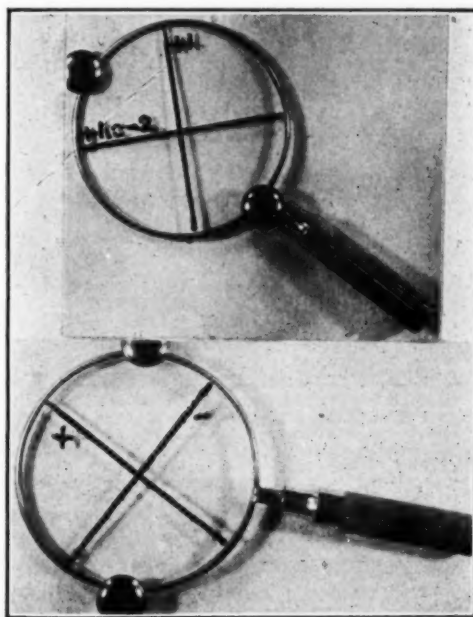


Fig. 1.—The upper photograph illustrates a cross cylinder made up of  $+1$  D. sphere combined with  $-2$  D. cylinder, and shows the correct mounting of the cross cylinder with its two axes at exactly  $45^\circ$  with the handle. In this and some other illustrations, the black lines are introduced to indicate the various details referred to in the legends. The lower photograph illustrates incorrect mounting of the cross cylinder, with its axes not at  $45^\circ$  with the handle.

have learned to use the cross cylinder tests freely find them all but indispensable. In my own undergraduate and postgraduate teaching, I devote more time to the cross cylinder than to any other detail of refractive technic. It is in the hope that I may be able to

\*The word "cross" is here used in preference to "crossed," since the shorter word is more euphonious and carries the same meaning as the longer.

render these tests more widely available, that I have undertaken the writing of this paper and the preparation of a somewhat detailed series of illustrations.

Even where the cross cylinder tests are used, I sometimes find their technic to be incompletely understood; and in passing I may say that the brief refer-

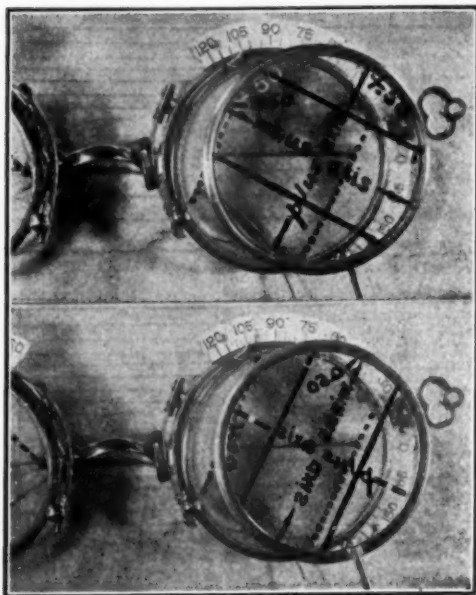


Fig. 2—Illustrates the position of the cross cylinder before the trial frame in testing for strength of cylindrical correction. In each photograph, the cylinder in the trial frame is at axis 60°. In the upper photograph the plus axis of the cross cylinder is at 60°, whereas in the lower photograph the position of the cross cylinder axes has been reversed.

ence to them contained in so excellent work on refraction as that of Thornton is not entirely accurate.

The cross cylinder is a compound lens having a net minus strength in one principal meridian exactly equal to a net plus effect in the opposite principal meridian. It is equivalent to a lens on one side of which is ground a plus cylinder of a given strength, and on the opposite side of which is a minus cylinder of the same strength, but at the opposite axis. In practice, it is usually ground as a minus sphere combined with a plus cylinder whose strength is twice that of the sphere. Thus we may have minus 0.12 sphere

combined with plus 0.25 cylinder, minus 0.25 sphere combined with plus 0.50 cylinder; minus 0.50 sphere combined with plus 1.00 cylinder or minus 1.00 sphere combined with plus 2.00 cylinder. Of these the more commonly useful are the two middle strengths.

The cross cylinder should be placed in a circular mount, the handle of which must be at forty-five degrees with the two principal axes. Any deviation from this adjustment will render the manipulation of the apparatus inconvenient, and the test possibly inaccurate.

The cross cylinder is not placed in the trial frame, but is held in front of it, and the patient is given an instantaneous choice between two positions of the cross cylinder, the handle of which is rotated quickly between the examiner's thumb and index finger.

In testing for strength of astigmatic correction, the cross cylinder is held with first one and then the other of its principal axes coinciding with the axis of the cylinder in the trial frame, or, if there is no such lens in the trial frame, coinciding with any axis in regard to which the presence or absence of astigmatism is to be determined. The patient is instructed to look at the lowest line of letters which he is able to read even partially or with difficulty; and as the cross cylinder is rotated from one position to the other, he is required to say in which position he is able more readily to read any given line of letters. Or, as regards each position of the cross cylinder, he may be asked to say which is the lowest line of letters that he can even partly read. Either position of the cross cylinder may blur the type, and the patient's objections on this score may have to be put at rest.

Except in final tests, or in case of doubt as to his understanding of the test, the patient should not be called upon to name the individual letters aloud, since his doing so is apt to familiarize him too greatly with the test card.

The preferred position of the cross cylinder indicates the general charac-



ter of the change which should be made in the cylinder in the trial frame. Thus, if the trial frame contains a minus cylinder with its axis at  $60^\circ$ , and the preferred position of the cross cylinder is that in which its minus

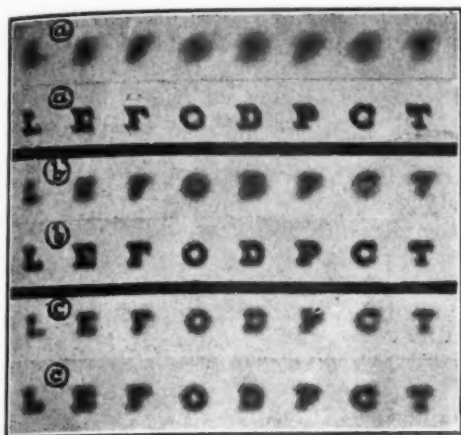


Fig. 3.—In this illustration the photographic camera has been made to imitate as closely as possible the appearances produced to the patient's eye during tests with the cross cylinder for strength of cylindrical correction. Myopic astigmatism axis  $60^\circ$  has been partly corrected with  $-0.50$  cylinder axis  $60^\circ$ . (a) In front of the cylinder in the trial frame is held a cross cylinder ( $-0.50$  sph. combined with  $+1$  cyl.) with first its plus and then its minus axis at  $60^\circ$ . The fact that the second position makes the type more distinct indicates that the strength of the minus cylinder in the trial frame is to be increased. In (b) the strength of the cylinder in the trial frame has been increased to  $-0.75$  D. The same test is made, and the greater distinctness with the second position of the cross cylinder again indicates an increase of the cylinder in the trial frame. In (c) the cylinder in the trial frame has been increased to  $-1$  D. This time the cross cylinder renders the type equally indistinct in both positions, indicating that the strength of the cylinder in the trial frame is now correct.

axis is at  $60^\circ$ , the strength of the cylinder in the trial frame should be increased. The reverse would be true if the preferred position of the cross cylinder were that in which its plus axis was held to correspond with the axis of the minus cylinder in the trial frame. And vice versa, if the cylinder in the trial frame is a plus cylinder.

Contrary to the statement contained in Thorington, the strength of cross cylinder employed, in conjunction with the particular line of letters which the patient is able to read with either position of the cross cylinder, does not necessarily indicate the exact increase or decrease required in the cylinder in

the trial frame. An increase or decrease is indicated, but after each such change has been made, the test must be repeated to determine whether the increase or decrease has been sufficient, excessive or inadequate. The correction required is determined when the patient finds himself unable to read more letters with one position of the cross cylinder than with the other.

For "roughing out" the strength of cylinder required, this test is usually rapid and very fairly accurate, especially if the patient is called upon each time definitely to determine the very lowest line on which any letters are legible; altho with all cross cylinder tests, the patient often needs to be carefully warned that he may never see so distinctly with the cross cylinder before the eye as he does without it. In the final fractions, and where the axis of astigmatism is nearly or quite vertical or horizontal, the test for strength is sometimes fallacious, in that the patient tends to prefer the position of the cross cylinder which produces a vertical rather than a horizontal distortion of the letters. For this reason, after I have found the approximate or final axis by means of the cross cylinder tests further to be described, I usually prefer to work out the final fractions of astigmatic strength by means of the revolving cross sold by one of our wholesale opticians under the name of the Camp Thomas astigmatic dial.

The cross cylinder test for axis is at first sight rather more complicated. It is based on the principle that two cylinders of like denomination, superimposed with their axes at an acute angle with one another, form a new cylinder of different strength, whose axis is somewhere intermediate between the two axes of the separate lenses.

If we lay a plus 1.00 D. cylinder upon another plus 1.00 D. cylinder, so that the two plus axes are  $45^\circ$  apart, the combination will be equivalent to a plus 0.25 D. sphere combined with a plus 1.50 cylinder, whose axis is exactly half way between the two separ-

ate axes. If the two cylinders are of unequal strength, the new axis will be nearer the axis of the stronger individual cylinder.

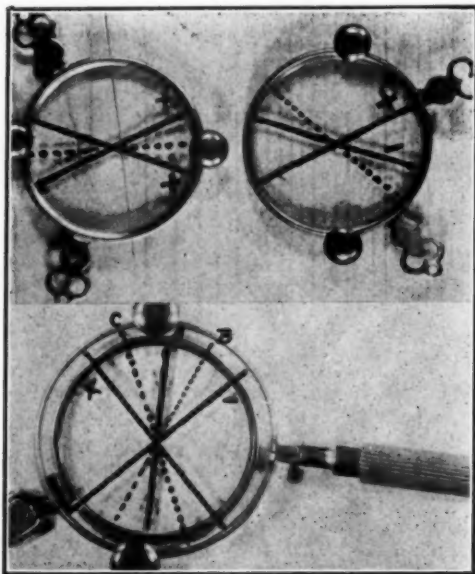


Fig. 4—Illustrates the principle upon which the cross cylinder is used in testing for the axis. In the upper left hand photograph, two plus cylinders of equal strength are superimposed with their axes  $45^\circ$  apart. The resultant is a weak sphere combined with a stronger cylinder whose axis, as indicated by the dotted line, is midway between the two original axes. In the top right hand photograph, a plus cylinder and a minus cylinder of equal strength are superimposed, and in this photograph the dotted line illustrates the position of the minus axis of the spherocylindrical combination thus produced. The lower photograph illustrates what takes place when a cross cylinder is held with its axes at  $45^\circ$  with the axis (A) of a trial cylinder. If the trial cylinder is plus, a new plus axis is produced in the general position indicated by the dotted line C, whereas if the trial cylinder is minus, a new minus axis is produced in the general position indicated by the dotted line B.

Suppose now that we have in the trial frame a minus 1.00 D. cylinder with its axis at  $90^\circ$ , and we wish to determine whether the axis should be changed in either direction from the exactly vertical position. A cross cylinder—say minus 0.50 sphere combined with plus 1.00 cylinder—is held with its two axes at  $45^\circ$  with the axis of the cylinder in the trial frame. If the minus axis of the cross cylinder is at  $45^\circ$ , there is produced before the patient's eye a new cylindric effect at an axis midway between  $90^\circ$  and  $45^\circ$ ,

that is at  $67\frac{1}{2}^\circ$ . If on the other hand the minus axis of the cross cylinder is at  $135^\circ$ , the resulting plus cylinder has its axis midway between  $90^\circ$  and  $135^\circ$ , or at  $112\frac{1}{2}^\circ$ . If the axis of the patient's astigmatic error lies nearer  $45^\circ$  than  $135^\circ$ , he may find the test type blurred by either position of the cross cylinder, but the blur will be less pronounced when the cross cylinder is held with its minus axis at  $45^\circ$  than when it is held with its minus axis at  $135^\circ$ . The change in position of the cross cylinder is again made by a simple rotation of the handle between the examiner's thumb and index finger.

The patient having expressed a preference as between the two positions of the cross cylinder, we must move the minus axis of the lens in the trial frame toward the preferred position of the minus axis of the cross cylinder. We have no exact indication as to how far this change of axis should be carried. But the cylinder in the trial frame is moved arbitrarily any

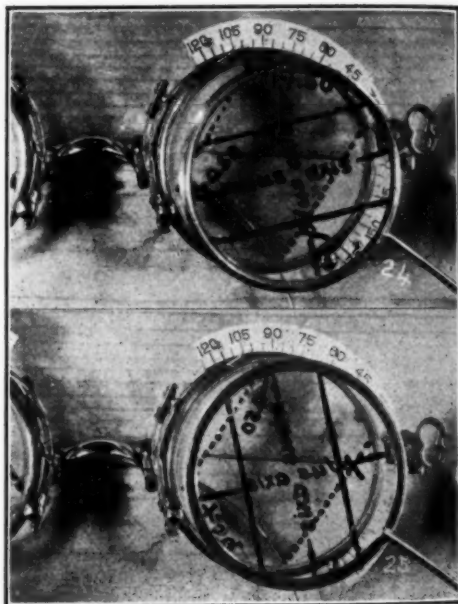


Fig. 5—Illustrates the position of the cross cylinder in front of the trial frame in testing for axis. The axis of the cylinder in the trial frame, as indicated by the dotted lines, is here  $60^\circ$ . In the upper photograph the plus axis of the cross cylinder is at  $105^\circ$  and the minus axis at  $15^\circ$ ; while in the lower photograph the relative positions of the axes of the cross cylinder have been reversed.

distance in the indicated direction, and the test with two positions of the cross cylinder is again made, only this time the axis of the cross cylinder must be at  $45^\circ$  with the new position and not with the original position of  $90^\circ$ .

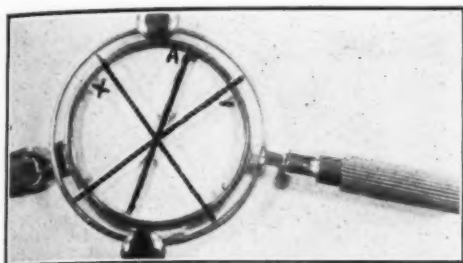


Fig. 6—Illustrates inaccurate placing of the cross cylinder in testing for axis, the axes of the cross cylinder not being at  $45^\circ$  with the axis (A) of the test cylinder.

At every new test, it is important that the cross cylinder shall follow the changed position of the cylinder which is in the trial frame. We may have shifted the position of the cylinder in the trial frame either too far or not far enough. In either case the next test with the cross cylinder will tell us whether to go farther or to come part way back. But as we gradually diminish the range of alteration in the position of the cylinder in the trial frame, we shall at last reach a position in which the patient is unable to read any more or fewer of the letters with one position of the cross cylinder than with the other. We have then reached the desired point and have determined the correct axis required by the patient, subject to any change which may be obtained in checking up the strength of sphere and cylinder.

Like all other astigmatic tests, this one is more likely to be successful if the accommodation is relaxed, and, therefore, if whatever spherical lens is in the trial frame is so strong a plus or so weak a minus as barely to allow the patient to obtain his full visual acuity. Further, the patient must base his comparison of the two positions of the cross cylinder upon a study of the lowest line of letters which he can

even partially or imperfectly read. It must also be remembered that the vision with the cross cylinder before the eye is very commonly less distinct than without it, and especially that at the final axis obtained, the cross cylinder blurs the vision equally in both positions of the test.

For eyes with good visual acuity, the test for axis may usually be made satisfactorily by means of the cross cylinder of minus 0.25 sphere and plus 0.50 cylinder. For the earlier stages of testing a high error, or sometimes as a check in unusually variable cases, the minus 0.50 sphere combined with

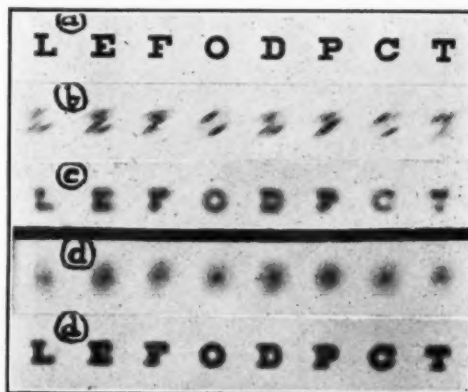


Fig. 7—In this and the next figure the photographic camera has been made to imitate as closely as possible the appearances presented to the patient's eye during tests with the cross cylinder for the axis of the correcting cylinder. (a) is the appearance of the test type as photographed thru the non-astigmatic photographic lens. (b) is the result of producing in the photographic lens a myopic astigmatism of 1 D, axis  $60^\circ$ . In (c) this oblique myopic astigmatism of 1 D. has been imperfectly corrected with  $-1$  D. cylinder axis  $90^\circ$ . In (d) and (e) a cross cylinder ( $-0.50$  sph. combined with  $+1$  cyl.) is held with its minus axis first at  $135^\circ$ , and then at  $45^\circ$ . The vastly greater distinctness produced by the second position calls for a marked shifting of the minus axis of the correcting cylinder toward  $45^\circ$ .

plus 1.00 cylinder is useful. The minus 1.00 sphere combined with plus 2.00 cylinder is of value in relatively amblyopic cases.

In making the cross cylinder tests, the patient should usually not be asked whether he sees better with the cross cylinder or without it. What is needed is the choice between its two positions. Furthermore, there is almost

never any advantage in checking the cross cylinder test for axis by means of the old fashioned method of turning

the cylinder in the trial frame in either direction until the patient decides that the vision is blurred.

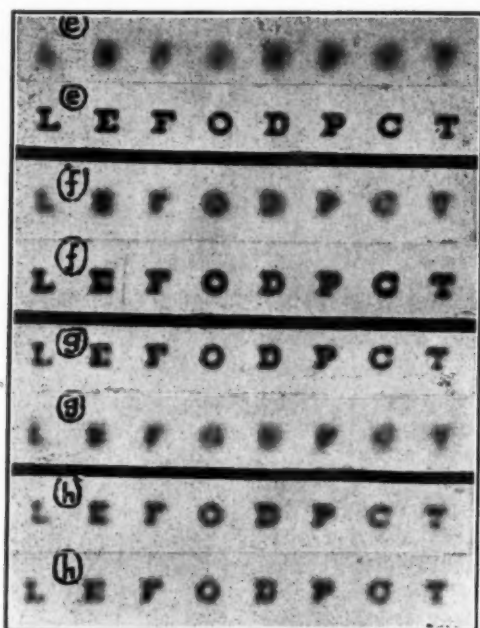


Fig. 8—In (e) and (e) the axis of the minus cylinder in the trial frame has been moved to  $75^\circ$  first. The cross cylinder is rotated with its minus axis first at  $120^\circ$ , and then at  $30^\circ$ . The greater distinctness produced by the second position calls for a further shifting of the axis of the test cylinder in the same direction as before. In (f) and (f) the axis of the minus cylinder in the trial frame has been moved to  $67\frac{1}{2}^\circ$ . The minus axis of the cross cylinder is first held at  $112\frac{1}{2}^\circ$ , and then at  $22\frac{1}{2}^\circ$ . Again, altho less decidedly, a further shifting of the axis of the test cylinder in the same direction as before is called for by the greater distinctness produced by the second position. In (g) and (g) the axis of the minus cylinder in the trial frame has been moved to  $55^\circ$ . The minus axis of the cross cylinder is first held at  $100^\circ$ , and then at  $10^\circ$ . The greater distinctness produced by the first position indicates that the axis of the test cylinder has been moved too far. In (h) and (h) the axis of the minus cylinder in the trial frame has been moved back to  $60^\circ$ . The minus axis of the cross cylinder is held first at  $105^\circ$ , and then at  $15^\circ$ . The equal indistinctness of the type with these two positions of the cross cylinder indicates that the correct axis has been found.

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## THE PRACTICAL SIDE OF THE OPHTHALMOMETER.

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This instrument altho not indispensable, if properly used gives results of such practical value in a brief time that it hardly seems possible to expend it to better advantage. Cases of astigmatism after operation, or due to industrial injury and keratoconus are cited to illustrate its value. It can also be used as a corneal microscope, as for superficial punctate keratitis. Read before the American Academy of Ophthalmology and Oto-Laryngology, September, 1922.

This instrument cannot be included with the indispensable equipment, but this is true of a great deal of our paraphernalia that we would be unwilling to give up, and I am certain that some of its bad reputation is due either to faulty technic, or prejudice from experience with some of the early, defective models.

Aside from scientific considerations, the ophthalmometer can be used in a practical manner in most refractions, and if conveniently arranged, will be a time economizing device, instead of a scientific toy as is frequently charged. We are not expected to use all of our refracting room equipment in every case; however, in adopting a routine method for ordinary work, we select the instruments and methods that in our individual experience are the most efficient.

It is agreed that the patient should be disturbed as little as possible during the test, and should not be moved around the room, unless there is a definite reason for so doing. By using swinging brackets attached to convenient side walls and noiseless casters on smooth floors, all necessary equipment, including the ophthalmometer, for an ordinary refraction can be quickly and quietly placed before the patient, who is not moved from the original position. Under this plan, the actual time consumed in measuring and recording the corneal curvature of both eyes with the ophthalmometer averages about two minutes. Ignoring the scientific interest and value of the psychologic impression, it hardly seems possible to devote this much time to better advantage.

The actual findings have been found to be of little value in writing the prescription, but are useful in giving

superficial ideas of what may be expected to be found later in the examination, and in checking the final result of other tests. If there are marked discrepancies, it is well to run over the test again, with a possibility of finding a clerical error in recording. Incidentally, I frequently find registered, especially in adults, a slight astigmatism with the rule, and if it is not verified by the retinoscope and trial case, its presence is not understood and is ignored. Possibly this is due to a pressure of the lids, and is corrected by the ciliary muscle.

If the patient is approaching or is past middle age, and the ophthalmometric measurements show a plus astigmatism, axis vertical, and the trial case gives a plus cylinder, axis horizontal, I would suspect lenticular changes which would mean, of course, beginning cataract. In this connection, it has been noted by several observers, that in the preopacity stage of cataract, the refraction usually shows astigmatism against the rule, and advantage is taken of this idea in using the ophthalmometer in this suspected condition.

Information gained relative to the radii of curvature in hyperopia and myopia are of interest, but to me have not been of much practical value. The refraction of the images of the mires in a marked case of irregular astigmatism is startling, and in a mild case will show distortions and irregularities plainly, and will at times give a clue to this trouble. My experience agrees with that of Sheard's regarding ophthalmometric measurements in keratoconus, in that they are the most valuable test, and the instrument is of great service in following the course of the disease.

Leaving out the irrelevant features, I will refer to a few cases illustrating the value of the ophthalmometer as a time saver.

**IRREGULAR ASTIGMATISM FOLLOWING OPERATION.**—Mrs. S. J. F., age 41. Left eye almost blind following removal of pterygium by another oculist four years ago. The ophthalmometer immediately revealed a very irregular astigmatism. Altho the positions of the mires were so distorted that they could not be recorded, yet, knowledge of the actual anatomic condition of the cornea justified satisfaction with obtaining a visual acuity of only 5/7.

**IRREGULAR ASTIGMATISM DUE TO INDUSTRIAL VOCATION.**—Mr. J. H., age 55, miner. Vision in right eye poor for years, because of numerous minor industrial injuries. The left eye, the useful one, was enucleated two weeks ago, following a panophthalmitis from corneal ulcer. The right cornea was pitted with minute superficial grey spots, the scars of many battles incident to his occupation. However, all central media were clear and the fundus normal. The retinoscopic reflex was too indefinite to be of any value, and the trial case was uncertain, but the ophthalmometer at once gave a line on the trouble, registering a rather irregular astigmatism of 5.5

diopters, plus, axis 90°. From this basis was easily worked out a correcting lens of plus-minus combination, which gave a useful vision of 1/2.

**KERATOCONUS.**—Mrs. J. A. B., age 25. Vision failing for six years, requiring frequent change of lenses. All refraction tests uncertain, especially of the right eye, the best vision of which being 5/20. Because of the distorted images of the mires, a tentative diagnosis of conical cornea was made which subsequently proved correct.

**KERATITIS PUNCTATA.**—Mrs. C. R. W., age 27. Suspicious teeth and tonsils. Some trouble with eyes since childhood, but worse for ten days and suffering acutely for two days. Eyes so sensitive that cocain was necessary for examination. Superficial structures inflamed, but no involvement of the iris, etc. The mires of the ophthalmometer well spaced and in alignment, but the individual mires are splotches resembling the cubist's art. Diagnosis confirmed with concentrated light and loupe.

Taking it for granted that the basis of this argument is logical, then also without reciting individual case records, the value of the ophthalmometer is apparent in the small pupils of senility, sensitive eyes, illiterates, amblyopes and in unusual conditions.

### THREE CASES OF ASTHENOPIA TREATED BY PSYCHOTHERAPY.

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In these cases there was some refractive error, with eyestrain and local symptoms aggravated by use of the eyes. But exaggerated importance was attached to the symptoms for fear of disaster to come. Slight change of glasses or local treatment with removal of the fear effected the cure. Successful treatment of such cases depends on accurate diagnosis and confidence and cooperation of the patient. The aid of consultants may be necessary. Read before the American Academy of Ophthalmology and Oto-Laryngology, September, 1922.

Let me admit in the beginning that the title of this paper is open to criticism. The term *asthenopia* is used in its broad sense of weak eyes, inability to use the eyes continuously without specifying the causative factors. The term is used for lack of a better one, and to avoid a lengthy explanatory title.

These three cases have this in common: in each there was a refractive error, which had caused some eyestrain and some local hyperemia and conjunctival irritation. These local symptoms were aggravated by use of the eyes, but were by no means serious in themselves. In each case, the patient attached tremendous importance to

relatively trivial symptoms, not for the reason that the suffering was great, but because the patient feared it was a warning of disaster to come.

There is a considerable group of postoperative cases which belong in the same category as these here reported. It is of prime importance to see that the operated patient is in the right frame of mind during convalescence, lest he magnify the importance of his sensations and delay recovery by his fears. All successful surgeons, whatever their specialty, pay attention to this, tho not always consciously.

CASE 1. An unmarried woman, 43 years old, complains that she cannot read even a minute or two without such discomfort that she has to stop. As her evenings are unemployed and she lives alone, the result is depressing and aggravates a tendency to morbid thoughts. During the day she is actively employed making fancy lamp shades, at which she is so busy that she requires two assistants. She does both designing and making, and works eight hours a day at this fine, near work. She has had careful correction of refractive errors by competent ophthalmologists. Her general medical advisor is a well trained man, with special experience in neuropsychiatry.

After careful examination of the eyes, no new defect was brought to light. She had O. D.—0.75  $\ominus$  + 1.75 axis 55°; V. = 6/18; O. S.—0.75  $\ominus$  + 1.50 axis 130°; V. = 6/8. Muscle balance, less than 1/2<sup>A</sup> L. hyp., no es. or ex.; at the reading distance, 3 1/2<sup>A</sup> exo. Accom. = 4.50 D. each eye. Conv. good; pr. div. 5<sup>A</sup>—6<sup>A</sup>. Overcomes 3<sup>A</sup> pr. b. down, and 2<sup>A</sup> pr. b. up, before left eye. She had been given glasses which varied from —.75 to 1. sph. with cyl. from + 1.50 to + 1.75 and with ax. 60° right eye, and 125° to 130° left. She had been given + 1.25 sphere added for near work, but without benefit. Six months ago a tooth had been extracted, after which the head was better. Given Jaeger I. to read, she manages to read a few words, then

thrusts it away, declaring she cannot stand it.

Fundi and media normal. Fields not taken. Lids, conjunctiva, and iris showed nothing to account for the trouble.

Since this patient was using her eyes on rather fine, near work for many hours a day without much inconvenience, and since careful examination showed no cause, it was obvious that the inability to read was not due to refractive errors, lack of accommodation, or muscle imbalance.

A little questioning, to draw out the patient's confidence, showed that she was dreading a serious breakdown of the eyes, which would compel her to give up her work and might mean permanent loss of ability to use the eyes. This was a serious handicap to her physician, who was unable to overcome her fears, since the oculists had not given her relief, and he could not but share her fear himself to some degree. There was no intolerable situation from which subconsciously she was finding a way of escape by inability to use her eyes; she was not trying to evade something which her sense of duty was urging her to do; that is, it was not a case of hysteria. Just the opposite was true. If the inability to use the eyes became general, and she had to give up her work, then indeed the situation would be serious. As she had already reached a point where she could no longer use her eyes for reading, it seemed to her not only possible, but probable, that before long she would be totally incapacitated, and she would far rather die. No wonder she was filled with fear.

After examining her with sufficient care and thoroughness to convince her that I was basing my opinion on adequate knowledge of the case, I assured her positively and emphatically that she had no disease of the eyes that would make her blind or lead to inability to use the eyes. I told her she need not give up her work, and that it was my belief that she would soon be able to read. In order to convince

her more fully, I pointed out some of my reasons for my belief. I pointed out the fact that if she had a serious defect which made it impossible to use her eyes a couple of minutes for reading, she could not possibly work on her lamp shades many hours a day. I explained that certain symptoms of discomfort which she felt when she began to read, which were thought by her to be signals which must be instantly heeded and would lead to disastrous results if neglected, were really nothing serious, and that it was her apprehension which incapacitated her. After explaining this at some length in as nontechnical and simple terms as I could, she suddenly interrupted me by saying: "You mean I have an anxiety neurosis." I said that was exactly what she had. She was pleased at the surprise she had given me by her technical knowledge, and explained that her physician had successfully treated her for a fear neurosis and had told her about it. (This concerned other functions, and had nothing to do with the vision.) This special knowledge and experience on her part made it easier for her to understand the nature of her eye trouble. It was not difficult to convince her that she had no serious eye disease and was not threatened with blindness or incapacity as she had feared.

I saw her on April 12 and 14; and then wrote the following letter to her physician:

"I saw Miss— again today. There is no question about her eyes being sound. Their accommodation and other functions are perfect; the only trouble is, she cannot use them.

"I explained it to her, and she perceived at once that it was an anxiety neurosis. She became alarmed some time ago at some symptoms, and anxiety did the rest, altho the symptoms were nothing serious. I think she grasps the idea, thanks to your training, and will cooperate fully.

"I told her to begin with about three minutes a day, and increase by one minute daily—paying no attention

to the discomfort she would likely feel at first."

She was given a soothing collyrium to relieve the discomfort, to be used as often as she wished. The patient left the office very hopeful and enormously relieved of her apprehension; but was told to return in a week, since such cases are apt to have a reaction and again fall a prey to their old fears. Her progress has been entirely satisfactory.

If I had seen this patient without the benefit of the experience of the ophthalmologist who had studied the case carefully before sending her to me with his report, I should probably have given a guarded prognosis on account of the defective vision (only 6/8 with correction) plus the apparent incapacity for reading. If, after adequate study and observation of the case, I had later decided that I could give a positive and emphatic favorable prognosis, it would have been far more difficult to convince her.

CASE 2. Man, 63 years old, Professor in a Western University, studying at Harvard during his sabbatical year. General health not good, due to some rather serious cardiac trouble. Referred to me by his oculist, because he could not read more than 15 or 20 minutes without such discomfort as to make him give up. Careful correction of refractive errors and suitable astringents for his slight chronic conjunctivitis, had failed to cure him.

Close questioning as to what made him stop reading showed that he felt a sensation of dryness and some scratchiness, and feared that if he disregarded these symptoms he would surely bring on serious eye disease, because these were the warning signs of eyestrain. It was his belief that if he had proper glasses, these symptoms would disappear, so that he could read without discomfort.

No opinion was expressed until I had completed a fairly thoro examination. This revealed no defects other than those already found by his previous oculist. He had distance O. D.



—7.00; O. S. —7.25  $\odot$  —0.75 axis 90; near, add + 2.50.

It was possible therefore to assure him with great positiveness that there was nothing serious the matter, that the symptoms which he felt when he used his eyes were very common and could safely be ignored in his case. He was given my favorite soothing collyrium\*, and directed to use it many times a day. Whenever the eyes felt uncomfortable, instill a few drops. As time went on, he would find that he would not need to use it so often.

A slight increase in the power of the cylinder was accepted; and in order to aid the mental effect, one lens was changed. This is often of some importance, when the patient comes with a strong preconceived idea that a change in glasses is needed.

A week or two later he reported that he was laid up with a cardiac attack, and could not come to the office; but that he was using his eyes more freely than he had for many months. Subsequent progress favorable.

CASE 3. A man of 75, referred to me by his oculist for obstinate blepharospasm. He complains that he cannot read or use his eyes more than a few minutes after dark, because his right eye closes (blepharospasm). He has had to give up going out in the evening, as well as reading or other use of his eyes.

Here again careful search brought out no new defects. His H. and P. were well corrected; he had no muscular defects. There was a moderate chronic conjunctivitis or conjunctival hyperemia. There was evidence of old iritis in the left eye, some lenticular opacities in both eyes. V. O. D. with —1.  $\odot$  + 0.50 axis 90 = 6/10 +; V. O. S. = 6/40, not improved by glasses. He was thought by one oculist to have glaucoma, and used pilocarpin for a while. He has been using

zinc sulphat 1:500, also syr. ac. hydriodic.

The significant feature was the ability to use the eyes during the day, and the occurrence of the blepharospasm only in the evening. I questioned him carefully about his lighting arrangements; and advised certain improvements to make the lighting more like daylight in its diffuseness and freedom from harshness. His reading was restricted, and a soothing collyrium given to be used ten times a day.

This gave no relief. Close questioning brought out the statement that after reading a short time in the evening, he would feel a smarting or irritation of the conjunctiva, and then the eye would shut. Having once fallen into the habit of responding to the slight conjunctival sensation by a spasm of the orbicularis, the habit easily perpetuated itself and had become chronic. I thought there was a possibility that by combining confident assurance that he would recover with the use of a dilute local anesthetic in the eye, to remove the sensation which seemed to be the initial factor in the vicious process, we might get a start in breaking up the habit.

He was directed to instill a drop of the anesthetic (cocain 1:500) at 6:45 p. m., and then begin reading. In ten minutes, repeat the drop and read ten minutes longer; then repeat the drop, but stop reading. After three days increase the periods to 15 minutes. At the end of a week, call again.

At the next visit he was not inclined to admit much improvement, but his wife was sure he was better. He was told that he was on the right track, and would eventually recover, but that a trouble which had existed so long could not be expected to get well in a few days. After another week he was told to begin to read without first putting in the drop, and use the drop only when the eye felt uncomfortable and inclined to close.

I did not see him again for over a year, when he came for something else, and I told him to go back to his

\*Foot Note.

Menthol	.5
Thymol	.5
Camphor	.5
Ol. Eucalypt	1.
Ol. Gaulther	1.
Ac. Borici	8.
Sod. biborat	88
Misc. sec. artem.	

Use this powder to make a  $\frac{3}{4}$ % solution in whatever quantity is desired.

former oculist. He had entirely recovered from his blepharospasm.

When the reaction to fear is thru the subconscious mind seeking a way of escape from an intolerable situation, we get hysteric manifestations. These cases are not of that type. Nor are they like certain cases of malingering, in which the patient greatly exaggerates some defect, in order to escape some situation, but does it consciously and intentionally.

In these cases which are here reported, the patient greatly exaggerates some minor pathologic condition, but exaggerates its significance or importance rather than its pain or discomfort. He fears that if his symptom is neglected, serious consequences will follow. He does it thru ignorance and from good motives. His cooperation is usually easy to secure. If you can convince him that his symptoms are in essence trivial, that they are not warning signals which he neglects at his peril, you can effect rather rapid cure, especially if the manifestations are on the higher mental levels, as in the first two cases. If, however, the pernicious effect has involved lower levels, and established a bad habit or habits which have become quasi reflex, automatic responses, no longer requiring cooperation of the conscious mind, then, as in the third case, the cure is more uncertain and may take a long time.

Try to get a clear conception of just what has gone wrong, and why. Then you must use your ingenuity, with much patience and sympathy, to break up the morbid process. Do not make the mistake of telling the patient, or implying, that there is nothing the matter. Asthenopia or blepharospasm from fear are just as real as asthenopia or blepharospasm from uncorrected hypermetropia and astigmatism.

Successful treatment of this type of fear or anxiety state depends first on accurate diagnosis: you must be sure that you have not overlooked or neglected the treatment of any possible

factor; second, you must convince the patient that you know what you are talking about, and you must secure his confidence and cooperation. The aid of consultants may be needed.

It is worth pointing out that it is much easier to handle successfully such a case, if, as in all three of these, it has been under the care of some other practitioner who has carefully studied the patient and assures you that he has corrected all defects to the best of his ability, and does not see why the patient should not be able to use his eyes. You make a thoro examination and confirm his findings. You can then talk to the patient with more positiveness and evidence of your own conviction, than you might feel safe in showing if you were seeing the patient for the first time, and did not have other expert opinion behind you. If you make a guarded prognosis, and show caution and a disposition to hedge, the patient inevitably senses *your* fear and seizes upon it as a confirmation of his own—and the case is worse.

Again, if a patient has been watched and treated thru some serious affection—say uveitis following cataract operation—it may be difficult for you to convince the patient that he can safely use his eyes and stop worrying. He knows how worried you were, and how you cautioned him not to do this or that. Now he feels some sensations which he thinks mean that he should still avoid the things you told him to avoid. If you arrive at the conviction that a case is of this kind, but only after you have studied and treated it for weeks or months, you are at a decided disadvantage when you attempt to convince the patient. He senses at once your change of attitude. He wonders whether your present opinion is any more likely to be correct than your previous one. If you find that you have not filled him with the necessary confidence and conviction, it is better to call a consultant to your aid. Obviously the doctors must agree among themselves.

# NOTES, CASES, INSTRUMENTS

## INCUBATION PERIOD OF TRACHOMA.

### Contagiousness in Atrophic Stage.

H. GIFFORD, M.D.

OMAHA, NEBRASKA.

In Dr. Patton's article on Wrestler's Trachoma (this journal, July 1922, page 545), altho no stress was laid on the question of the incubation period, the evidence was so confirmative of my personal experience, that I think it worth while to refer again to the latter. In Dr. Patton's cases the shortest incubation period mentioned was four to five days; the longest ten days. The others were six, six, eight, and about eight respectively, giving an average incubation of very close to one week.

My own experience was as follows: In the late eighties, while expressing an infected area in the tarsus of a trachoma patient in the atrophic stage, the forceps slipped off with a snap and I immediately felt a small drop of fluid strike my left eye. I was wearing spectacles at the time, but the drop evidently got the proper parabolic curve to pass over the spectacle frame and into the eye. I intended to wash the eye out on completing the treatment, but forgot to do so. Exactly one week later, the eye began to water and feel uncomfortable, and within twenty-four hours the lids were quite swollen and the conjunctiva presented the appearance of well marked acute trachoma. Under my own tolerably constant treatment of sulphat of copper and an occasional expression of the folds, a cure was effected in about two years; and altho at one time the sight in the eye was reduced to about 20/100, the recovery was complete with normal vision. By paying attention to obvious precautions, the infection was prevented from reaching the second eye.

This case is of special interest, as the patient from whom the trachoma was acquired was a typical example of the atrophic phase of the disease; a form

in which some men who admit that it is contagious in earlier stages, deny the possibility of contagion. This man's conjunctiva was mostly pale, smooth, and shiny, with decided atrophy of the folds and upper tarsal plate; but there were a few slightly thickened reddish areas; and he was subject to recurrent keratitis.

My experience with trachoma has been quite extensive, as in this region it is quite common in all the races represented, except the African. I have only seen two cases among negroes, and altho the clinical diagnosis seemed certain, these cases were not followed up. Among the so-called Americans our largest contingent comes from the poor whites, who reach us from the South and East along the valley of the Missouri. The apparent immunity of the negro race, which was so strongly insisted upon by the late Swan M. Burnett, depends, I believe, entirely upon race segregation. In the wilds of Africa the race probably was free from it (altho I have seen one reference to it among the African aborigines, due probably to mistaken diagnosis); but where the color line is not drawn closely, as in the Orient, Brazil and some of the Dutch West Indies, the negroes suffer from trachoma along with the whites.

The explanation of one sided cases of trachoma is simple enough, where precautions have been purposely carried out. Beside my own case, I have had many cases in which the patients, after due instructions, have confined it to the first eye. Where no such precautions have been taken, the immunity of the second eye has in some cases been, I am sure, only apparent. Nearly all the cases of this sort which I have seen have shown slight traces of former trachoma in the apparently immune eye; the infection having run a mild course and having undergone a spontaneous recovery which has conferred a certain immunity to subsequent infection from the other eye.

Such cases of spontaneous recovery under little or no treatment do occasionally occur. More common is an apparently spontaneous cure, in which a stage of tolerance is reached early in the disease; so that altho the disease remains active and infectious, it may run along from twenty-five to fifty years with no subjective symptoms beyond a slight proneness to lacrimation and irritability. The apparently spontaneous outbreak of trachoma in families where any chance of infection is stoutly denied, I have sometimes found to be explained by the presence of this latent form of trachoma in one of the grandparents.

Dr. Young, whose experience has apparently led him to doubt the immediately contagious nature of trachoma (this journal, Sept. 1922, p. 766) evidently thinks that the Wrestler's Trachoma, observed by Dr. Patton and myself, may not have been genuine. The diagnosis of trachoma must still, of course, be a clinical one, and while I occasionally am in doubt for a time, as to the nature of a particular case, Dr. Patton's patients, nearly all of whom I also saw, had such pronounced infiltration of the folds and of the tarsal conjunctiva, that the diagnosis was as absolutely certain as it could be in any case; this conclusion being furthermore confirmed by the course of the disease, which we have followed, for from four months to a year and a half, in five of the patients referred to. Dr. Young has somehow gained the impression that our wrestlers got well "promptly" on the use of "astringents and expression." On the contrary, as the itinerant nature of their occupation prevents steady observation and treatment, their trachoma has run a long and troublesome course with frequent exacerbations, whenever treatment has been neglected or eased up. In only one of them has a tolerably certain cure been effected, while in others the disease is still active after from one to two years.

## GLIOMA INVOLVING ORBIT.

CHARLES J. ADAMS, M.D.

KOKOMO, INDIANA.

In my paper on Intraocular Tumors in Young Children, published in the A. J. O., December, 1922, I reported (vol. 5, p. 969) a case for which the parents refused to have any operation. This child died November 13, 1922. The accompanying picture was taken four days before death. There was a tumor in each eye, but in the left eye was not progres-



Fig. 1. Recurring glioma of the orbit. Adam's case.

sive in character either forward or backward. The one in the right eye grew very rapidly, as can be seen from the illustration. The immediate cause of death was starvation; the child became comatose 4 days before death.

A bit of the tumor was sent to the National Pathological Laboratories of Dr. Hektoen. The report upon it states: The ordinary sections show a dense accumulation of small cells, like glia cells, and the preliminary diagnosis was glioma. Sections stained by special methods to show the characteristic intercellular substance were prepared. With the special stains glial fibrils were found which would definitely establish this tumor as a glioma.



# FORCEPS FOR TRIAL CYLINDERS WITHOUT HANDLES.

SIDNEY L. OLSHO, M. D.

PHILADELPHIA, PA.

In the most modern trial cases the cylindrical lenses are without handles. It often becomes awkward or difficult

# CATARACT EXTRACTION IN A MAN SUFFERING FROM PERNICIOUS ANEMIA.

JAMES B. STANFORD, M.D., F.A.C.S.

MEMPHIS, TENN.

In August of this year, T. B. H., white, 66 years old, consulted me about

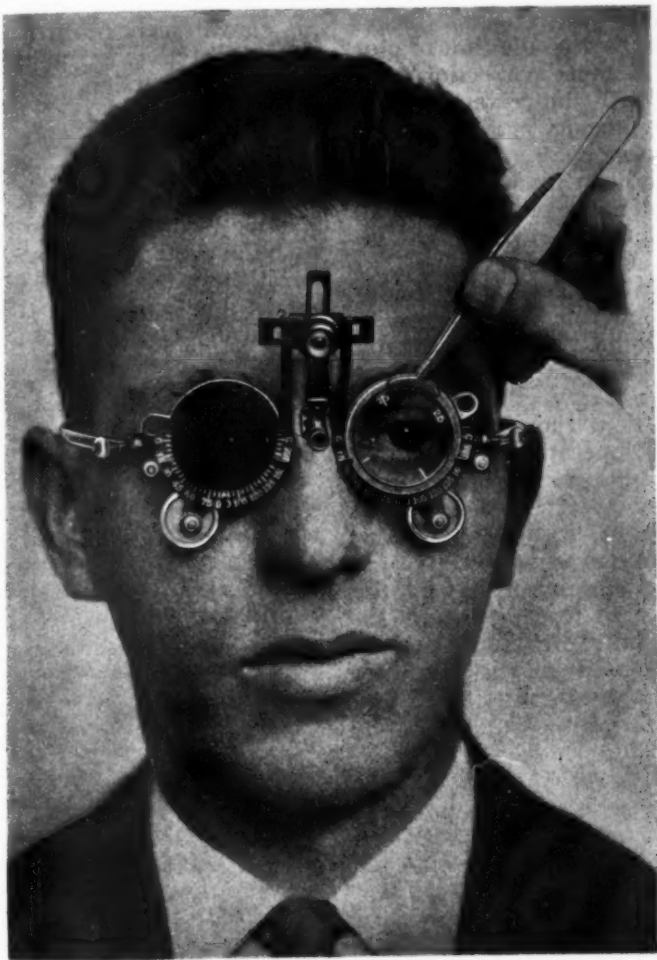


Fig. 1.—Forceps and manner of using them to place cylinders in the trial frame, or to turn, or remove them. (Olsho.)

to quickly remove, and to replace accurately, a second cylinder in front of the correction already in the trial frame.

The forceps illustrated, are designed to hold such a lens firmly, in close approximation, accurately, at any desired axis and to permit instant lifting and replacing of the second cylinder.

his eyes. He has been quite nearsighted for some years and for the past few months he had been unable to read his newspaper. His health has been poor for many years, and his hearing quite defective. His only pastime is reading, and since he has been unable to read, he has become more or less melancholy. His physician in-

formed me that he has pernicious anemia.

His vision was 20/50 minus and Jaeger 10 in the right eye, and 20/200 and Jaeger 10 in the left eye. The vision of the right eye was improved to 20/40 by a minus 1.50 S., and that of the left eye improved to 20/50 minus by a minus 3.00 S. The near vision was improved to Jaeger 4 and Jaeger 10 respectively, by the addition of plus 2.50 S. to the distance correction. He read Jaeger 4 with the corrected right eye with some difficulty in a good light, but with the same correction and with the ordinary light at his home, he was unable to read news print. Ophthalmoscopic examination revealed nuclear cataract in each eye, that of the left eye being more advanced. No fundus details were made out in either eye.

It occurred to me that an intraocular operation in a case of pernicious anemia might be accompanied by hazards other than those encountered in an ordinary operation. I knew, of course, that persons suffering from pernicious anemia are liable to retinal hemorrhages, but I did not know whether or not reducing the normal tension of the eye by allowing the aqueous humor to escape would increase the liability to such hemorrhages. I searched all the literature available and was unable to find any

help on the subject. I am reporting this case for the benefit of other ophthalmologists who may be confronted with the same difficulties.

On October 24 I did a combined iridectomy and cataract extraction under local anesthesia. The lens was extracted in capsule and the corneal suture was used. The only feature of his convalescence worth remarking on is the fact that at no time has there been much reaction. The eye has been almost as white as the other at all times since the operation. On October 29 I made an ophthalmoscopic examination, finding the media clear and the fundus normal, except for the paleness to be expected in his case. On October 31 he was allowed to leave the hospital. On November 6 the eye was practically clear, and on that date his refraction was plus 11.00 S. combined with plus 2.00 C. Axis 165° with which his vision was 20/40. By adding plus 3 S. he was able to read Jaeger 3.

On November the eighteenth his refraction was plus 9.50 S. combined with plus 3.50 C. Axis 165°; with this his vision was 20/25 plus. By adding plus 3.50 S. he reads Jaeger 2. This reading correction was prescribed.

His media are clear and the fundus normal, except for the paleness of disc and retina.

# SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

## ROYAL SOCIETY OF MEDICINE, LONDON.

### Differentiation and Prognosis of Arteriosclerotic and Renal Retinitis.

A combined meeting of the Sections of Medicine and Ophthalmology was held on Tuesday, 28th of November, under the chairmanship of the President of the Section of Medicine, DR. G. NEWTON PITT.

DR. H. BATTY SHAW, speaking from the medical side, said he had had the opportunity of studying the clinical aspects and the postmortem findings in a number of cases, in whom the heart was found, at the necropsy, to be hypertrophied; and the only way he could explain the facts the cases revealed was to jettison former explanations and seek others. Some of the observed cases died of uremic symptoms, yet the kidneys did not show the changes usually described as occurring in them. Albuminuria was present in varying intensity, or it was absent, yet the kidneys presented no uniform appearances leading to the view that they were responsible for the former, or of the latter, condition of the urine. Nor did the changes in the retina reveal what form of kidney was present in the cases. Some of the cases which had shown signs of grave disorganization of the brain, disclosed a brain which, to the naked eye, was normal, and its vessels presented no change in either middle coat or intima.

The phenomenon known as *hyperpiesis* seemed to be directly associated with the cardiac hypertrophy they all presented, and it was very variable, and nothing had yet revealed why those fluctuations occurred. He had been taught to believe that this phenomenon was caused by arteriosclerosis, which, for the present discussion, he would limit to the change met with in the middle coat of the arteries. The question which arose was, How could the variable hyperpiesis be due to the stable arteriosclerosis? He believed

there could be no such dependence, and he had to invoke the presence of a variable amount of poison in the blood to explain the variable hyperpiesis, as also the arteriosclerosis.

This likewise got over the difficulty of explaining the correlation of many of the accepted signs of "renal" disease when little or no actual renal disease was present. A break away had occurred in regard to the nomenclature of kidney disease, and the kidney changes were now held more to be due to toxemia, resulting from bacterial action at a site remote from these organs. Changes in the intima of the arteries could be produced experimentally by the injection of bacterial toxins, and now it was claimed that the changes in the middle coat were of the nature of a chronic inflammation. His strong inclination was toward the toxic view.

Ophthalmic surgeons admitted that they met with difficulties in differentiating arteriosclerotic retinitis from albuminuric retinitis; they had also admitted that an arteriosclerotic retinitis might be succeeded or accompanied by the signs of renal retinitis. Some ophthalmologic experts were now prepared to concede that the changes in the retinae in renal retinitis were toxic, and that the seat of origin of the toxic agents was prerenal. So that, for them, even renal retinitis was a misnomer.

Why did changes occur in the retina in arteriosclerotic retinitis? When the hemorrhage had passed off, no sign of ruptured retinal artery or vein had yet been demonstrated. He believed the hemorrhages were likely to be capillary in origin. Where did the white patches seen in arteriosclerotic retinitis come from? If they were formed from local elements, what provoked their formation? Surely the cause was not arteriosclerotic changes. Was not a blood borne noxious agent more likely? A general infective agent seemed to be behind all the changes, even those in the middle coat of the arteries.

It was said that renal retinitis was always bilateral, yet works by ophthalmic surgeons revealed that "renal" changes might be shown in one retina by unilateral papilledema, conforming with the observation that blood poisons need not necessarily produce symmetric changes. The question might well be asked, What was the source in secondary anemias of the development of soft edged white patches in the retina, indistinguishable from the "cotton-wool" patches of renal retinitis? He thought it likely that the changes met with in arteriosclerotic retinitis were not due to the vascular change; but that the hemorrhages and white patches and the slight change in the disc differed only from those in renal retinitis in being called into operation by a slower influence of blood poisons. It was more reasonable to look upon arteriosclerosis as a first effect, and arteriosclerotic retinitis as a later one, effects of a toxemia which acted slowly and in minimal quantity, and when it acted in large bulk, the other type of retinitis resulted. But this latter needed a name other than renal, for the changes in the kidney might be minimal. For the terms now current he suggested "chronic," "acute," "late," "early," leaving for the future the investigation of the nature of the toxin concerned.

#### Retinitis of Arteriosclerosis.

MR. R. FOSTER MOORE said his object was to bring forward evidence supporting the view, that in some cases of arteriosclerosis a distinctive form of retinitis was developed; due, in his belief, to a local vascular disease in the retina. These cases had usually been confused with those of renal retinitis, and it had been said that renal retinitis in the old was less serious prognostically than in the young. He set out to establish the following propositions:

1. That the ophthalmoscopic appearances of the condition were, in large measure, distinctive as compared with renal retinitis.

2. That the retinal exudates were

developed as a result of the local vascular disease in the retina.

3. That as to length of life and manner of death, this ophthalmoscopic condition implied a prospect in sharp contrast with that conveyed by renal retinitis.

He submitted a table of 47 cases of retinitis, most of which he had observed for a number of years, and giving many important features.

In regard to the first of his propositions, he said that in most cases of general arteriosclerosis the retinal arteries shared to such a degree, that their condition was recognizable by the ophthalmoscope; certainly this was so in 70% of 44 consecutive cases seen at St. Bartholomew's Hospital. He believed exudates were due to a thickening of the coats of the arteries and a reduction of their lumen. In these cases he thought the local pressure in the retinal arteries was less than normal, altho the pressure in large arteries was raised. The areas of exudate, tho not pathognomonic, had features which rendered them in large measure distinctive.

This form of retinitis was frequently unilateral; it was so in 28 instances out of 45. Still, evidence of disease of vessels was always present in the other eye. The unilaterality did not persist for very long. Individual spots of exudate could be proved to disappear and leave no trace; but usually fresh ones were simultaneously appearing. In two of the cases, disappearance of the exudate followed thrombosis of the retinal artery. The chief points in which the ophthalmoscopic appearances differed from those of renal retinitis were: the character and distribution of the exudate and the changes seen in it, the frequency with which it was unilateral, its association with severe retinal vascular disease, and the absence of edema and of "cotton wool" patches.

In support of his second proposition, he quoted the history and course of a number of cases. One, under the care of the late Mr. Marcus Gunn in 1908, had, at that time, extensive arteriosclerosis but no retinitis. Her urine



was free of albumin and sugar. This was the condition until 1910. In 1911, she came under the late Mr. Coats, who found white glistening spots disposed radially round the macula, and albumin in the urine. When, in 1913, Mr. Foster Moore saw her, she had a blood pressure of 250 mm., a cloud of albumin in the urine, and retinitis in each eye. In 1918 she had a stroke, and her blood pressure was 260 mm.

With regard to his third proposition, it was true that few patients lived so long as two years after renal retinitis was discovered. Of Bell's 419 patients, 94% died within 2 years. But the prognosis was less grave and more uncertain than in renal cases. Cerebral appoplexy might, in such patients, occur at any time; on the other hand, life might be prolonged for several years. As to the manner of death, in a considerable proportion it was from uremia in renal retinitis. Exactly 50% of his own cases died of a gross vascular cerebral lesion. The condition called for separate recognition, and he considered that the term "arterio-sclerotic retinitis" seemed appropriate.

MR. P. BARDSLEY had long held the views of Dr. Batty Shaw on the toxic origin of retinitis and sclerosis, views which he had himself brought forward more than once. He admitted that the picture of arteriosclerotic retinitis drawn by Mr. Foster Moore was correct, but thought the description applied only to very chronic cases. Stated otherwise, the retinitis depended on the acuteness of the disease producing the sclerosis. But if the toxin was more drastic, or an exacerbation occurred, the resultant picture resembled closely that of the so-called renal retinitis. He quoted a case in support of this. There were four classical changes in renal retinitis:

1. Retinal edema, resulting in radiating lines or a macular star.
2. The fatty spots.
3. The hemorrhages.
4. The high pressure signs in the vessels.

All these signs might be present in three groups of cases without albuminuria, viz., in intracranial pressures, in advanced arterial sclerosis,

and in many toxemias. As, therefore, these retinal signs occurred frequently without albuminuria, and the latter could only be diagnosed by urine analysis, the term "renal retinitis" ought to be abolished, as it was misleading. The ophthalmoscope showed there was a toxemia causing blood pressure and vascular inflammation, also whether there were sclerotic changes in the vessel walls. On this latter, prognosis largely depended. If such sclerosis was present, he believed death was a matter of only months, possibly weeks. If there were but little sclerosis with the raised blood pressure, there was a prospect of fair length of life. The sclerosis was the index of the chronicity of the poison, not of its acuteness. He contended it was possible to detect sclerosis in the vessels when high blood pressure was not present, and physician and patient could be forewarned. He gave a striking illustration of this.

MR. P. H. ADAMS, (Oxford), described the case of a man with a wound in the hip joint, who complained of blurred vision. He had typical renal retinitis, slight papilledema, soft "cotton wool" patches, and hemorrhages, with a stellate figure at each macula. Yet practically nothing abnormal was found in his urine. His wound was very septic, and he was extremely ill, but after amputation and free drainage he quickly recovered both health and sight, and was still well. This showed that toxemia could itself cause the condition known as renal retinitis, without the kidney being involved. He believed that Dr. Batty Shaw's explanation would prove to be the correct one. His experience as to the length of life of these patients agreed with that of Mr. Foster Moore. He was more convinced than ever that a prognosis could not be made on the eye condition alone. Further research on the matter should be carried out jointly by physicians and ophthalmologists.

DR. ARTHUR ELLIS spoke of a preliminary investigation he had been conducting with two colleagues, on this subject, when he received the in-

vation to take part in this debate. It was concerning 19 cases showing retinitis in which an estimation of renal function had been made. All the patients, with one exception, had a high blood pressure; in only 3 was it less than 200 mm., i. e., in one it was 180, in one 160, in another 148. In this last case Mr. Goulden reported one hemorrhage, and that both fundi showed central degeneration and thickening of vessels in both retinas. In 8 of the 19 cases there was evidence of gross renal damage and loss of function, with marked retention of urea in the blood. In 6 of the 8 there was a fixation of specific gravity. Of those 8, 4 were now dead of uremia, one of bronchopneumonia, and one was now dying of obvious renal inefficiency.

In the remaining 11 cases there was very little evidence of gross disturbance of renal function; in only 2 was there retention of urea in the blood, and in none of these was there fixation of specific gravity. Only 2 of these 11 patients were known to be dead, one of cerebral hemorrhage, the other of myocardial failure. The important question was, was one of these groups a further stage of the earlier group? Before this could be settled, there would have to be a large series of post-mortem examinations in cases which had been carefully observed and followed thruout their diseased life.

DR. C. O. HAWTHORNE, in a careful speech, protested against applying to the conditions under discussion terms which assumed definite knowledge when such was, so far, lacking.

DR. J. F. GASKELL expressed his agreement with Mr. Foster Moore's views on renal and vascular disease. Two conditions, of entirely different pathology, were concerned: one primarily a disease of the kidneys, the other of the vascular system as a whole. With regard to the first of these, there were various stages of diffuse nephritis with which were associated the forms of retinitis called albuminuric. The second condition was a cardiovascular one; in which three factors always played a part;

raised blood pressure, cardiac hypertrophy, and disease of small arterioles of certain organs. In the purest examples of this condition the vascular changes of a degenerative nature were confined to the small peripheral arterioles, the largest arteries being free from the change. The kidney involvement was never sufficient to make primary failure of this organ the cause of death. Death was almost always due to the changes in the brain, cerebral hemorrhage being by far the commonest occurrence. It was difficult to know whether the arteriosclerotic changes in the arterioles were secondary to the high blood pressure, or whether the latter was a response to obstruction to the peripheral circulation thru essential organs. He agreed, however, that the changes were due to a cause which acted on the circulation as a whole. He favored the term suggested by Sir Clifford Allbutt, namely, hyperpiesis.

#### Resumed Debate on Arteriosclerotic and Renal Retinitis.

This debate was resumed at a joint meeting of the Sections of Ophthalmology and Medicine on Friday, December 8th, the President of the former Section, MR. A. L. WHITEHEAD, occupying the chair.

MR. ERNEST CLARKE reopened the discussion. He said he thought the papers on this subject by Dr. Batty Shaw and Mr. Foster Moore would prove to be epoch making. The teaching many years ago, and until quite recently, was that high blood pressure was the cause, or one of the causes, of "hemorrhagic retinitis," and patients were sent to a physician to have that pressure reduced. It was now seen that high blood pressure was but one of the symptoms; it might even be a protective measure. The best term for the condition was probably, "hemorrhagic retinitis."

With regard to the exudates which occurred, he asked where they came from, and what caused them. If they were due to toxins, why should they not occur in both eyes? If they were

associated with hemorrhage, the last question was answered. It would be useful, in future, where hemorrhage was seen in one eye, to take the tension of both the patient's eyes with a tonometer. He asked whether Dr. Batty Shaw suggested that the thickening of the middle coat and the intima, were followed later by degeneration of these coats. Even the oozing hemorrhages presumably must be regarded as danger signals, a first stage which, if allowed to continue, might develop into so-called arteriosclerotic retinitis, and later into renal disease.

DR. W. N. GOLDSCHMIDT related a fatal case of prerenal toxemia showing the clinical symptoms or signs of chronic parenchymatous nephritis. He said the success of an attempt to distinguish between "renal" and other forms of retinitis turned partly on what symptoms and signs, other than retinitis, justified the labeling of a case "renal," and the case he quoted illustrated the difficulty of the problem. He also entered into the question of the effect of decapsulation of the kidney and other remedies.

The patient was a man, aged 42, and he came complaining of swelling of legs and abdomen for six weeks; he also had shortness of breath on exertion and occasional headaches. His only serious illness had been an influenza febrile attack in Egypt in 1918. There was no venereal history. He had marked edema of abdomen, legs and back, with ascites; blood pressure 132 mm. There was some pleural effusion at both bases. He had pyorrhea and abdominal meteorism, and there was great flatulence after meals. About 200 cc. of urine (sp. gr. 1030) was passed in 24 hours, and it contained 2% of albumin. There were in it red cells and numerous casts, but the urea concentration was about normal. Wassermann reaction negative, fundi normal.

No progress was made under medicinal and dietetic measures, therefore, *decapsulation of a kidney* was tried, Mr. Gwynne Williams carrying out the operation. The kidney was found to be of normal size and color. The in-

testines were pale, but there was no peritonitis visible. Four days later he passed 900 c. cm. in 24 hours, and the edema was somewhat less; 10 days after the operation it rose to 1,200c. cm. the albumin being .36%. Within four days, however, it dropped quickly to 600 c. cm. As it was possible the increased output of urine might have been due to the operation, it was decided to repeat it on the other kidney, and this was done seven weeks after the first; the capsule, which was not tense, was slit and retracted. Several pints of milky fluid, as in the first operation, were removed from the abdomen.

The speaker related the clinical course in great detail; the end was death. The postmortem changes were also detailed. The sections of the piece of kidney removed during life showed definite slight changes such as could be produced by a toxic agent arriving in the blood stream. The sections removed after death showed only slight changes in comparison with a normal kidney. Therefore, the illness did not seem to be accounted for by the state of the kidneys. It was probably due to a prerenal poison which caused exudation into the tissues.

MR. LEIGHTON DAVIES (Cardiff) said ophthalmic surgeons agreed there was a distinct difference between hemorrhagic retinitis with sclerosis on the one hand, and retinitis associated with albuminuria on the other, and these were largely recognizable by the retinal picture. But it had to be remembered that all people were not cast in the same mould, and there would be different reactions to the same morbid process. Hence no clinical group could have hard and assigned lines given to it; there would always be borderland cases, consisting of abnormal types. The two groups of conditions differed also in the matter of prognosis as regards life, the expectation of life being definitely greater in the arteriosclerotic than in the renal cases.

That a like toxin should produce different reactions in different persons

had an analogy in the case of the pneumonia bacillus. In one there would be croupous pneumonia, in another meningitis, in a third synovitis. A kidney of disordered function might lead to retention of material which acted as a poison, yet it did not follow that what caused the nephritis produced also the retinitis. Of 15 cases of the arteriosclerotic type, only one showed hemorrhagic retinitis. The importance of blood pressure in the conditions under discussion had been made clear. He did not think knowledge was sufficiently wide and certain to embark upon a new nomenclature.

MR. M. S. MAYOU showed, by the epidiascope, sections of arterial degeneration in the retina, of thrombosed central artery following vascular sclerosis, of thrombosis of central vein, a vein blocked by a fibrous clot, and an interretinal hemorrhage which had destroyed the retina right thru. He also depicted exudations into various layers.

DR. G. NEWTON PITT reminded the meeting that the changes which took place in the large vessels, the medium vessels, and the arterioles were independent each of the others. It was often assumed that in cerebral hemorrhage arteriosclerosis was present, but there were autopsies on many cases of the kind in which the arteries, including the middle cerebral, were not extensively diseased. And the number of cases of cerebral hemorrhage with marked interstitial nephritis was quite moderate. What he had said, applied equally to the case of the retina, whose vessels closely approximated in size to those usually giving way in the brain.

It was desirable to ascertain the relation between the cases which died of cerebral hemorrhage on one hand, and those who died of a condition in which there were retinal changes. The occurrence of cerebral softening and cerebral hemorrhage in the retinal cases raised the question whether the lesions were due to the rupture of a minute vessel, or to a thrombosis. In many cases, he thought, the latter was indicated. He agreed that the prognosis in the two classes of cases was

quite distinct. In some cases having arteriosclerotic vessels he thought some of the tissues were suffering from too low, rather than too high, a blood pressure.

DR. FEILING spoke of a study he had made of 30 cases from the standpoint of the physician, all the cases having been referred to him by his ophthalmic colleague. Only 5 of these were renal, their average age was 43.8 years, and all had well marked bilateral retinitis. The average systolic blood pressure was 235 mm., the diastolic 135. In the 25 in the arteriosclerotic group, the average age was 63.3 years, and 15 of them were females; 60% per cent of these had unilateral retinitis. The average pressure of the blood in these 25 was 214 systolic, 118 diastolic. He discussed the various theories of causation, and asked attention to the mechanical form of causation, such as in a case in which marked visual defect occurred in as short a time as 12 hours.

MR. J. HERBERT FISHER reminded the meeting that in 1915 he read a paper before the Ophthalmic Section on the retinitis of pregnancy, in which he advocated the use of the term *toxemic retinitis of pregnancy* instead of albuminuric retinitis of pregnancy. Obstetricians believed that pathologic vomiting of pregnancy, eclampsia, acute yellow atrophy of liver, and the necrotic changes of the kidney cortex which accompanied the albuminuria of pregnancy were due to a toxin, and that this might be produced by perverted katabolic processes in the syncytium cells shed from the chorionic villi and put into the maternal circulation. In the organs liable to attack the stress was on the blood vessels, hence hemorrhages were a conspicuous feature. It was reasonable to infer that the fulminating lesions in the retina in these cases, with the exudates, hemorrhages and edema, were due to the same cause. Mr. Fisher also referred to that disease of later life, retinitis circinata. This was so chronic that its explanation on the basis of an alteration in the arterial tunics fulfilled every requirement



without invoking an absorption toxemia.

If the toxic explanation of both varieties were accepted, it was reasonable to expect that in the arteriosclerotic cases, with efficient kidneys, the toxin should be found abundantly in the urine but in low concentration in the blood; while in the albuminuric cases the toxin should be found in concentration in the blood, but only sparsely in the urine. Perhaps pathologists could determine what the toxin was.

DR. HARFORD said it appeared, from Dr. Batty Shaw's introductory paper and from the remarks of subsequent speakers, that there was no such close relationship between changes in the retina and disease in the kidneys as had been commonly held. This required a review of the situation, meantime refraining from giving the grave prognosis which previously held views suggested, for such a forecast might hasten the fatal issue. Probably the appearances in question were common to many forms of disease which caused changes in the periphery of the vascular system. He quoted the following from a paper read by Professor Hugh Maclean at a meeting of the British Medical Association:

"There are many subjects who show but little evidence of marked cardiovascular changes, but in whom the renal system is hopelessly inefficient. Conversely, it is not uncommon to find patients with very marked cardiovascular changes in whom but little evidence of renal disease can be ascertained. These points must always be taken into consideration in estimating prognosis, for, in a general way, apart from such accidents as cerebral hemorrhage, the outlook in a patient with high blood pressure is not so bad if the kidneys are efficient. Indeed, such patients may enjoy comparatively good health for many years, even with a blood pressure as high as 200 mm. of mercury or even more. This observation explains the curious cases one occasionally finds quoted in the literature, in which a history of high blood pressure of 250 or over, fre-

quently associated with retinitis and other eye changes, was not incompatible with the enjoyment of fairly good health for several years. He deprecated the continuance of prophecy as to the date of a sufferer's death when he had this disease, because of the "emotional trauma" set up. In a case of panic there might be a state akin to temporary paralysis, or, in passion, violent muscular tremors.

With regard to the changes in the peripheral circulation, assuming that, as Dr. Batty Shaw said, there was a toxic process affecting both kidneys and retina, the problem was that of the selective action of the various toxins causing changes in the various vital organs. There was much evidence to prove the profound influence of suggestion upon local inflammations and vascular disturbances, and he hoped the teaching of modern psychology would be considered in its relation to obscure problems of pathology.

DR. BATTY SHAW, dealing in his reply with some of the speeches at the first meeting, said the discussion had at least given an opportunity for a statement of claim to those who believed there was something behind arteriosclerosis, which was also responsible for other changes, such as those met with in the retina when the blood vessels of that tissue were altered, and for similar changes in the retina when such vascular change was slight or absent. It encouraged those who looked for some agent responsible for both, in the blood circulating in the vessels. All that had been said against the view that arterial disease was responsible for so-called arteriosclerotic retinitis could be equally urged against the view that the contracted kidney was responsible for uremia. He thought a large proportion of Mr. Foster Moore's cases showed hyperpiesis, because there was some pressor body circulating in the blood stream.

MR. FOSTER MOORE also replied. He said it was clear to him that there was such a thing as a retinitis due to toxemia, and retinitis might occur from local causes in the retina. In

renal retinitis there were two factors at work: the toxic one, which showed itself by the "cotton wool" patches and the fibrinous exudate in the retina; and the vascular factor, which was seen by the sharp dots mentioned, and by the hyalin degeneration in the external molecular layer of the retina. And both factors might be concerned in a case. He did not suppose the hemorrhages in the retina were due to rupture of large vessels; they were probably due to diapedesis from the capillaries, owing to the altered condition of the blood. In these cases he thought the blood pressure in the small vessels was lower than in health, even tho the blood pressure in the brachial artery might be 250 mm. In anemia the hemorrhages came about in the same way, thru impaired nutrition in the capillary walls, due to the poor blood. Mr. Bardsley said "copper wire" arteries might disappear, but such an occurrence was outside the speaker's experience. In answer to Mr. Ernest Clarke, he thought the exudates were due to degenerative changes in the external molecular layer of the retina, owing to the impaired circulation in the retina.

He did not pretend it was possible to draw a hard and fast line between arteriosclerotic and renal retinitis. He did not think the hemorrhages were due to emboli in the retinal vessels; they were different from the hemorrhages associated with infective endocarditis. It would be found, on following cases up, that a considerable proportion of cases of severe retinitis developed detachment of the retina.

H. DICKINSON.

#### COLLEGE OF PHYSICIANS OF PHILADELPHIA.

##### Section on Ophthalmology.

October 19, 1922.

DR. MCCLUNEY RADCLIFFE, Chairman.

##### Superficial Punctate Keratitis.

DR. WM. ZENTMAYER presented a man, forty-two years of age, a mail carrier, who came to the Wills Hos-

pital because of a mist before his right eye, which had been present for twelve days and was accompanied by a sensation of a foreign body in the eye. He gave a history of frequent colds previous to having had his septum straightened one year ago. The eye affection gave the usual history of a preceding coryza and a slight conjunctivitis. The left eye was unaffected. The lesions were small and grouped in the central portion of the cornea, the overlying epithelium being slightly elevated. There was no anesthesia.

##### Extensive Pigmentation of Conjunctiva.

DR. WM. ZENTMAYER presented a colored woman, about forty years of age, with an unusual pigmented condition of the conjunctiva in the right eye, starting at a point about four o'clock and encircling the cornea to about eight o'clock. The pigment was of a chocolate brown color and was distributed much like a subconjunctival hemorrhage; there being a dense central area and a gradual fading off from this into the surrounding conjunctiva, the densest portion being somewhat elevated and granular, and at two points invading the cornea for a distance of about 2 mm. There was no disturbance of the function of the eye. The patient stated that this condition had been present from birth, but that within the past year it had increased in size and had become annoying. The case had been too recently seen for careful study, but appeared to be a nevus which is becoming malignant. It is the intention to have the corneal portion desiccated before advising a more radical operation.

##### Professor Barraquer's Operations in Philadelphia.

DR. WM. ZENTMAYER reported on the results in the Barraquer operations performed in Philadelphia. His paper is published in full in this JOURNAL. See p. 202.

*Discussion.*—DR. HOWARD F. HANSELL said that no doubt the Barraquer operation performed by a skilled opera-

tor and under exceptionally good condition of patient, operator and environment leaves nothing to be desired. Its advantages are obvious. All intracapsular extractions, where everything goes right, are presumably superior to those in which the capsule is left behind. Before attempting such a procedure, the operator must be thoroly familiar with the difficulties and risks and must give them full consideration. The record of the results of Barraquer's personal performances at the various hospitals in Philadelphia as reported by Dr. Zentmayer in his well prepared paper are not encouraging. Personally, I see no reason for the adoption and practice of the method, and I shall continue to operate in all cases in which I have the choice by the method I have advocated for years, namely, preliminary iridectomy, the use of the capsule forceps and expression. We should remember that the patient's welfare is our first consideration. After all the retention of the capsule is not a serious matter. I do not agree with Dr. Knapp, who has expressed the opinion that discission is a serious operation. Naturally we would like to avoid capsulotomy, but if it should be necessary it is comparatively free from danger when done under proper antiseptic measures.

DR. P. N. K. SCHWENK said he did not consider the Barraquer operation as safe a procedure as the usual combined extraction. In his judgment too many eyes were sacrificed before one could become proficient in the technic. He felt indebted to Professor Barraquer for demonstrating his modified Van Lint method of anesthesia, which he has since employed in all his cataract operations.

DR. T. B. HOLLOWAY stated that he thought the work done by Professor Barraquer while in this country was an exhibition of skill that one is seldom privileged to witness. As far as his own cases were concerned, there was not the slightest slip in routine or technic. As Dr. Zentmayer stated, three of his cases were operated upon, one of these being a mature, another a

slightly hypermature, and the other an immature cataract on which a preliminary iridectomy had been done. If these are to be compared with his three cases that had been operated upon by Colonel Smith, the results were decidedly better.

All things being equal, and assuming an experienced operator, adequate sterilization, etc., probably the greatest danger in cataract extraction is unexpected orbicular action. The fact that certain operators prefer to control the lids by the fingers, others by a speculum removed at different stages, Colonel Smith by his ingenious hook (which Dr. Holloway felt should be on the instrument tray for every case in which the eye is opened), the excision of the external canthal ligament by Axenfeld, and finally the use of the Van Lint injection, seem to substantiate this.

Professor Barraquer was clever and wise enough to fortify his procedure by the use of the last method, as well as by a conjunctival flap suture. As Dr. Hansell has intimated, this suture doubtless resulted because it was found expedient in the experimental stages of this operation, and it will be recalled that these early statistics are not available. Dr. Holloway thought, that without the Van Lint injection, the Barraquer procedure would be a dangerous one. This operation as well as the Smith-Indian operation are highly technical; and it was felt that they should not be attempted by anyone until he had mastered the older operative procedure and felt competent to deal with the complications that might arise. Personally, he preferred, in a certain group of uncomplicated cases, to do a preliminary iridectomy, and he would desire such an operation to be done on himself in case an operation should be necessary. For the remaining uncomplicated cases a combined extraction was preferred. In all complicated cases a preliminary iridectomy was thought advisable, and among these complicated cases he would include those instances where the fellow eye was bad, either as a re-

sult of disease, or because of failure of a previous operative procedure. It was felt that in the last instance it was fair to assume that the operator was not at fault, but that the patient was what might be regarded as a bad actor.

DR. S. LEWIS ZIEGLER stated, that his experience with intracapsular extraction was limited to three operations that he had seen Barraquer perform at Wills Hospital, and some half dozen that he had seen Smith perform, together with a series of Smith-Indian operations that he had performed himself some years ago. He had experienced no bad results, but there had occurred some curious clinical manifestations that he had never seen in the ordinary type of combined extraction, probably caused by the sharp pressure required in the use of the delivery hook. Future experiments may develop a simpler and more successful procedure, but one cannot enthuse over the present status of the intracapsular operation, either as to technic or end results. Removal of the lens in its capsule leaves a globe without a truss for internal support and without an interfering capsule. We no longer fear after cataract, because it is so quickly relieved by V shaped capsulotomy.

He cannot agree with those who favor preliminary iridectomy, except to relieve one condition, cataract complicated by uveitis or posterior synechiae, which von Graefe demonstrated was favorably influenced by iridectomy. Immature cataracts are better delivered by free cystotomy combined with removal of the cortex by aspiration or by irrigation. Aside from the dangers of added traumatism arising from two operations, there is the depressing psychologic effect occasioned by disappointment and waiting on the part of an aged and infirm patient, who gains no visual improvement from the extra operation. Some also prefer to add a preliminary cystotomy, but this delay is likewise disappointing to the patient.

Dr. Ziegler always prefers to make the combined operation at once and

so end all anxiety. If this is performed with the average skill, the result will be a success, and he can see no good reason for making "two bites of a cherry."

DR. WM. CAMPBELL POSEY said, that the previous speakers voiced his views in the performance of the cataract operation. On account of the strain, both mental and physical, he limited preliminary iridectomy to only so-called "desperate" cases, i. e., where the other eye had been lost for some reason. He thought Professor Barraquer should be commended for the exceeding care which he gave to all the details of his operation.

In answer to Dr. Hansell's query, Dr. Posey replied that preliminary iridectomy, while in itself a simple procedure, necessitated in many instances the patient's going into the hospital three times, for the preliminary iridectomy, for the extraction, and for the needling. While an excellent procedure, it was not to be recommended in most cases and only resorted to where there were extraordinary risks attending the operation, as, for example, when the fellow eye was hopelessly blind.

DR. BURTON CHANCE said, it had been his privilege to receive Professor Barraquer at the Wills Hospital, to attend him thruout his visit there, and to witness all the operations performed by him. It was something worth while to see the Spaniard's use of instruments and to note the dexterity of his beautiful hands. His long knife, with the back edge made keen for a number of millimeters, was interesting; as was also the beak of the iris forceps which ended in a straight point at right angles to the curve of the jaws, thus providing a sort of shoulder, which, by supporting the corneal flap, facilitated the seizure of the iris in the peripheral zone and thus helped to make the small buttonhole coloboma possible. Dr. Chance marvelled at the poise of the surgeon in the midst of unfamiliar surroundings; many things happening to interfere, the uncertainty of the electric motor to drive the



erisiphake; the strange faces; the impediment of language, everything, yet he rose serenely over all. The length of time occupied in the preparation of the patients and the duration of the operation, Dr. Chance's patient required forty minutes, were of particular note. In conclusion, he said he wished that he might have had an opportunity to see Professor Barraquer operate by the ordinary flap and expression method. He is grateful to him for demonstrating the power of the injection of novocain, which so surely serves to control the lids, that Dr. Chance has not had one escape of vitreous in the forty extractions he has had since he has employed it.

DR. ZENTMAYER said in closing, that the discussion had taken a scope beyond the limits of his paper; but had served the useful purpose of again putting the members of the Section on record as to their preferences in cataract operations. And he would add his, which is for a preliminary iridectomy, where the patient is under fifty-five and the cataract immature. Otherwise he prefers combined extraction. Where possible he does a cystectomy.

Replying to Dr. Ring, he stated that he believed unfavorable visual results in the paper presented, were due to the fact that the result had been reported very soon after the operation, and that the refraction was probably somewhat hurriedly done. Some of the cases showed a haze in the anterior part of the vitreous which accounts in part for the poor visual results.

In reply to the query why Professor Barraquer stitched the lids together, Dr. Zentmayer stated that he had not seen this done, but knew that it had been done in some of the operations. He supposed it was done because there was a temporary paralysis which prevented complete closure of the lids, and also because it was an excellent procedure, aside from the further complication of an already elaborate technique.

#### **Removal of Cataractous Lens by Suction.**

DR. FRANK C. PARKER (by invitation) said, the removal of the cataract-

ous lens by means of the suction, or more correctly speaking, the vacuum method, can be accomplished without a cumbersome apparatus as advocated by Barraquer. The apparatus may be simply a tube, one end of which terminates in a properly designed cup for approximation to the anterior capsule of the lens, whilst the opposite end is connected to a mouthpiece thru a small rubber tube. This comprised the apparatus with which twelve cases were operated upon. Buccal suction was found sufficient to remove the lens.

The lenses extracted, as shown in the illustrations appearing in Barraquer's paper in the American Journal of Ophthalmology for October, 1920, showing the lens being withdrawn as is customary in a regular combined extraction, were prone to be followed by a small amount of vitreous, as no air could enter to fill the evacuated space formerly occupied by the lens. The secret of extraction by this vacuum method lies in tumbling the lens on a horizontal axis, so that during removal the suction or vacuum cup is beneath the lens, whose posterior surface now lies in contact with the cornea. By tumbling, air is admitted; and, also, the zonula is broken allowing of easy extraction. In Dr. Parker's twelve cases, he proceeded as in the usual combined extraction, a small iridectomy being made. Van Lint's injection was used to control orbicular spasm.

He thought the danger associated with any suction or vacuum apparatus lies in its possibly becoming detached from the lens allowing of evacuation of the contents of the globe thru the tube. This danger he has eliminated by a recently constructed instrument, which can be plunged directly into the vitreous with any amount of suction, buccal or instrumental, and sustained for any length of time without the loss of more than one or two minims of vitreous, fluid or otherwise. An absolute protection is guaranteed that no more than this small amount can be drawn up into the tube. This removes the danger of this particular operation as far as accidental withdrawal of vitreous is concerned.

As to the adoption of this method, he did not wish to appear as an advocate of the promiscuous extraction of cataracts by this procedure, but simply desired to make it known that a complicated apparatus is unnecessary and that buccal suction can be utilized.

*Discussion.*—DR. P. N. K. SCHWENK said, he considered Dr. Parker's modification more practical than the Barraquer method. Less time was consumed in the operation and the simplicity of the instrument was less likely to induce excitation of the patient. Dr. Schwenk, however, felt that should he himself require an operation for cataract he would select the combined method of extraction.

DR. BURTON CHANCE said he had witnessed the first and nearly all of the subsequent operations in Dr. Parker's series, prior to Professor Barraquer's visit. The simplicity of Dr. Parker's procedure is the marvel of it, and, contrasting that simplicity with the complicated and likely to be uncertain mechanical vibratory suction apparatus of the Spanish surgeon, one is all the more attracted to it. Of course, at this day, one might well hesitate to utilize one's mouth as an adjunct to the power of any instrument to be inserted into the eye. Dr. Parker is working on a bent glass tube to hold sterile water which shall enable the operators to perform the operation under aseptic conditions. It is astonishing what power the vacuum exerts, for, the cortical zone of the lens is drawn into the cup of the cannula, as might be seen to take place, by noting the prominence remaining on the surface, if for any reason the cannula has been separated from the lens.

DR. S. LEWIS ZIEGLER commended Dr. Parker's ingenious modification of Barraquer's technic and also his simple suction instrument; but suggested the addition of a miniature ball valve like that of Redard, to prevent fluids from the operator's mouth trickling down into the patient's eye. It would also be an improvement to add a clear glass tube as the handle of the suction tube.

The instrument could then be used to aspirate soft cortex, as is done so freely in Paris, where simple extraction with Kalt's suture still holds sway.

DR. LEIGHTON F. APPLEMAN asked whether, in view of the unsatisfactory visual results obtained in those patients operated upon by Barraquer while in this city, Dr. Parker had obtained better visual results with the intracapsular method which he uses.

#### **Pathogenesis of Quinin Amblyopia.**

DR. T. B. HOLLOWAY stated that Dr. A. E. Forster, of Kalamazoo, Mich., during his second year of study in the Graduate School of Medicine of the University of Pennsylvania, had made the experimental study that he was about to present. Shortly after the completion of his second year an illness from which he had been suffering became aggravated and he died on August 24, 1922.

In this study Dr. Forster gave a résumé of the literature pertaining to this subject and the results of his animal experiments, which were conducted in Dr. Kolmer's Laboratory. In this study quinin and urea hydrochlorid and ethylhydrocuprein hydrochlorid were the substances used.

This paper will be published in full in an early number of the JOURNAL.

*Discussion.*—DR. BURTON CHANCE said that the Section is indebted to Dr. Holloway for presenting this interesting paper, and the reading of it should serve as a memorial to a faithful student. It is to be lamented that one who gave such promise should have been cut off so untimely, and we all honor the bravery of the man, who must have endured great pain in the last days of his life.

#### **Mechanism and Uses of a Variable Test Letter.**

DR. J. MONROE THORINGTON (by invitation) read a paper describing such a letter, its construction, manner of variation and use which will be published in full in an early number of this JOURNAL.

CHARLES R. HEED, M.D.,  
Clerk.

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JEAN MATTESON, Room 1209, 7 West Madison Street, Chicago, Ill.

## TUBERCULIN IN OCULAR DISEASE.

The specific clinical characters of germ diseases and the specific immunity they produce suggest specific reactions of the living body to particular bacterial products. It seems reasonable to assume that specific body reactions occur, and it is extremely desirable to know what they are. But this does not prove that the reactions that have been already discovered are really of this character.

That body reactions to microorganisms or their products are protective in purpose is very probable. All inherited reactions to environment may be assumed to have been established because they were useful to the organism that developed them. To arouse an appropriate reaction when it is needed, is real specific therapy, the most refined and developed form of therapeutics.

But it must not be assumed that because this goal has been clearly conceived, and we are working toward it, that we have reached it. We must not assume, because the antigen obtained from syphilitic liver has so generally a particular effect on the blood of the luetic patient, that the Wassermann re-

action is absolutely specific. We must not feel that a reaction following the introduction of tuberculin into the body is conclusive evidence that the patient has tuberculosis. Neither can we be sure that failure to obtain a positive reaction in either case proves conclusively that the patient is free from the disease.

Of reactions of the body produced by germ products, those that we have known longest and understand best are not specific. Fever, pain, swelling, leucocytosis are all general reactions, produced by a wide variety of invading microbes. Between these and such truly specific reactions as may in the future be discovered, probably lie other reactions, characterized by their usual association with certain diseases, but likely, sometimes, to be produced apart from such associations. Then, too, specific treatment may still be found more or less effective, or more or less harmful under different circumstances. We know there are different varieties of tubercle bacilli, and different ways of preparing tuberculin. Of the variations in the effects they may produce we know very little that is definite. What can be said of the use of tuberculin in ophthal-

mology must be said with caution and reserve.

Bearing this in mind, the subject is still one of great interest and importance. We must avoid putting all our faith in one test or in one remedy. But the positive value of the tuberculin test has added materially to our ability to recognize tuberculosis. With a clearer conception of the clinical signs of the disease, it should give much the same certainty of recognition that we have for most of the acute specific fevers.

The specific significance of the reaction depends largely upon the smallness of the dose that provokes it. To very large doses it is conceivable that a reaction will be obtained in persons who are free from tuberculosis. A general reaction to less than 1 mgm. of old tuberculin probably indicates tuberculosis somewhere in the body. A reaction to a dose of over 5 mgm. is almost worthless as an aid to diagnosis.

The general reaction pointing to tuberculosis somewhere in the body does not prove that the ocular lesion is tuberculosis. There has been a disposition not to regard the eye lesions as tuberculous unless evidence were found of tuberculosis elsewhere in the body, or of family susceptibility pointing in that direction. Hence undue importance has been attached to the general evidence of the presence, or absence, of tuberculosis. The clinical evidence of the appearance and course of the ocular lesion must be considered in deciding whether it is tuberculous. So must the local reactions to dermal and intradermal tests.

The focal reaction to tuberculin injections seems to have a higher significance than that of other reactions that may be produced by tuberculin. But even this should not be accepted to the exclusion of all other evidence. It is probably more valuable than any other one reaction or symptom, but all the evidence in the case should be considered together. It was the especial violence of the focal reaction that caused the practical giving up of the Calmette test for ocular lesions that might be tuberculous; and the danger of hemorrhage as a focal reaction should lead to a great caution, in the use of tuberculin injections

where danger of intraocular hemorrhage is a feature of the case.

As to the therapeutic use of tuberculin in ocular tuberculosis, the writer believes it has been fully demonstrated that it can in some cases be very beneficial. But it has been shown that in too large doses, or too frequently repeated, it can be harmful. It is also contraindicated when extraocular lesions are already pouring into the circulation the products of the tubercle bacillus.

The tuberculin treatment is a proper one for ocular tuberculosis if properly used in appropriate cases. But it is not the only treatment. The well known remedies rest, diet, outdoor living and favorable climate, which are of proved value for tuberculosis elsewhere in the body, should all be applied in ocular tuberculosis. They are more to be relied on than tuberculin, and in many cases, especially where there is active tuberculosis elsewhere in the body, they should be relied on to the exclusion of the tuberculin treatment. E. J.

#### USE AND DOSE OF TUBERCULIN.

It is essential that patients with suspected tuberculosis of the eye, be examined first by a competent internist to determine whether active tuberculosis exists elsewhere in the body, before the use of tuberculin is considered for diagnostic or therapeutic purposes. Tuberculous activity in the lungs or elsewhere in the body may be a contraindication to the use of tuberculin; and the verdict regarding the advisability of its employment will rest on the internist.

For diagnostic purposes, old tuberculin, "O. T.," given subcutaneously, is superior to other preparations. The initial dose should be determined by the clinical type of the ocular lesion. Focal reactions in tuberculosis of the anterior segment, which follow the subcutaneous administration of tuberculin, usually disappear in two or three days without leaving any permanent damage to the eye, and a large initial diagnostic dose, 0.0001 to 0.001 mg., may be given. If no reaction occurs in 48 hours, 0.01 mg. may be given. In



the absence of reaction, the dose should be increased at 48 hour intervals to 0.1, 1.0, 3.0 and 5.0 mg. respectively. The larger doses frequently cause local reactions, especially if they are given in the same area as previous injections.

The management in lesions of the posterior segment must be more cautious, because focal reactions are frequently followed by hemorrhage or exudation which may permanently injure the eye. In suspected tuberculosis of the retinal vessels or of the choroid, smaller initial doses must be employed, 0.000,005 to 0.000,025 mg. If no reaction occurs in 48 hours, a second dose of 0.0001 mg. may be given. In the absence of reaction, the dose should be increased in the same manner as it is in lesions of the anterior segment. Focal reactions are manifested by increased congestion, exudation (swelling), hemorrhages, and changes in the visual acuity. The eye should be examined at 8, 24, and 48 hour intervals after each injection of tuberculin.

The Pirquet, Moro, and Calmette tests are of no value in adults, and throw little light on the true nature of eye lesions in children.

Bacillus emulsion "B. E.," tuberculin residue "T. R." and old tuberculin "O. T." may be used for therapeutic purposes. The former is preferred. In most cases one should begin with very small doses and increase gradually. With the exception of tuberculosis of the retinal vessels, the initial therapeutic dose of B. E. or T. R. should be 0.0001 mg. and O. T. 0.001 mg. The dose should be increased 0.0001 mg. for B. E. and T. R. at each injection until 0.001 mg. is given, when the increase should be 0.001 mg. for each dose. When 0.01 mg. is reached, 0.01 mg. is added until 0.1 mg. is given. The increase is then at the rate of 0.1 mg. a dose, until 1.0 mg. is reached. This is the maximum therapeutic dose that should be used. When O. T. is employed, larger doses are required, but the increase should be in the same ratio as that for B. E. and T. R.

There is difference of opinion regarding the frequency for administration of tuberculin. Some begin with two day intervals and increase one day with the dropping of each cypher of the decimal in the dose. Others follow four day intervals until large doses are reached, and another group prefers one week intervals. The latter are the safer. When 1 mg. of B. E. or T. R. or 5 mg. of O. T. is reached, the interval should be lengthened to one month, and three or four doses given before the treatment is discontinued. It will require at least one and one half years of treatment to complete a full course of tuberculin therapy.

In tuberculosis of the retinal vessels and in acute choroidal tuberculosis, very much smaller doses of tuberculin must be employed. An initial dose of 0.000025 mg. should be tried and the dose increased by adding the same quantity with each subsequent administration, following the same scheme as is used in the less hazardous cases.

The types of ocular tuberculosis (not retinal) which tend to progress rapidly and quickly destroy the vision, must be dealt with more heroically. Large doses with the aim of obtaining a frank local reaction, are desirable. In this class of cases, the reaction may be followed by improvement and the eye saved.

When larger doses of tuberculin are reached, some patients react unfavorably, and the administration must be discontinued for several weeks before the treatment may be resumed. Smaller doses should then be employed and increased gradually.

Because of variation of tolerance in different persons, one is compelled to individualize in some instances.

W. C. F.

#### THE INTERNATIONAL CONGRESS OF OPHTHALMOLOGY, LONDON, 1925

At the International Congress of Ophthalmology held in Washington in April, 1922, Mr. Treacher Collins presented an invitation on behalf of all

the Ophthalmological Societies of Great Britain and Ireland, to hold the next Congress in London in the year 1925. The invitation was accepted and preparations for the Congress are going forward rapidly. A general committee consisting of representatives of the inviting Societies has since met and has formed an executive committee, empowered to make arrangements for the 1925 Congress.

It is to be held in London during the four days, Tuesday 21st to Friday 24th July. The three official languages are to be English, French and German. The subscription for membership has been fixed at the sum of £2. Invitations will be sent to the principal Ophthalmological Societies or other representative bodies in every nation, asking them each to nominate a delegate to the Congress who would be responsible for promoting its interests in the country which he represents, so as to endeavor to make it a great reunion of all those interested in Ophthalmology thruout the world.

"The Executive Committee is composed of: Mr. E. Treacher Collins, Chairman; Mr. J. Herbert Fisher, Vice-Chairman; Mr. Ernest Clarke, Treasurer; Mr. Leslie Paton, 29, Harley Street, London W., and Mr. R. R. James, 46, Wimpole Street, London, W., Secretaries; Mr. A. B. Cridland; Mr. J. B. Lawford; Mr. Humphrey Neame; Sir John H. Parsons, F.R.S. and Mr. A. H. H. Sinclair."

The above announcement will be most welcome to the ophthalmologists of America. The representative British ophthalmologists who attended the Washington Congress added greatly to the gratifying success of that meeting. Mr. Collins, Col. Elliot, Mr. Clegg, Dr. Mackay and Dr. Rowan, not to mention the Canadian colleagues who worked loyally and energetically for it. All contributed effectively to the success of the Washington meeting.

Appreciation of their assistance and the opportunity of meeting them again, as well as the scientific importance of the gathering and the attractions of a summer trip to Great Britain, should

make the American attendance at London larger than it has been at any preceding Congress of Ophthalmology.

It is not too early for those who feel they have something to offer, worthy of the attention and discussion of the ophthalmologists of the world, to begin to prepare for the presentation of papers on that occasion. Indeed it is well for those who merely desire to attend and enjoy such a gathering, as this will be, to lay their plans for a long vacation that year to be spent in getting better acquainted with world leaders in ophthalmology, and the cities of Western Europe and their ophthalmic institutions.

It will be a matter for regret in a large part of America that Spanish is not among the official languages of the Congress. Probably German is included in the hope to make the Congress fully representative of the ophthalmologists of the world. The time has come when this should be tried; and it is to be hoped that the great ophthalmologists of German speaking countries will feel that it lays upon them a responsibility to do all they can for the success of the London Congress. It is also to be hoped that the growth of good feeling among the peoples so recently at war, and the improvement in economic conditions, within the next two years, will make it possible for the London Congress to eclipse in numbers and interest all preceding International Congresses of Ophthalmology.

E. J.

#### TRANSACTIONS OF WASHINGTON CONGRESS.

The Publication Committee has on hand a limited number of Transactions of the Washington International Congress of Ophthalmology. Copies may be obtained by forwarding a check, money order or international money order, for ten dollars (\$10.00) to Dr. William Zentmayer, Chairman of the Committee, 1506 Spruce Street, Philadelphia; or to Dr. Luther C. Peter, Secretary, 1529 Spruce Street, Philadelphia, Pa.

We have already advised the readers of this JOURNAL, who were not members of the Congress, to secure this volume if they had the opportunity. It is one that is certain to be referred to in future and the demand for it will increase. The number of copies available is very small, in comparison with the number of men who could profitably add it to their libraries.

### BOOK NOTICES.

**Oftalmologia Tropical.** Robert Henry Elliot, M.D. (Lond.), Sc. D. (Edin.), F.R.C.S. (Inglaterra). Edicion Española, traduccion por la Dr. Francisco Maria Fernandez, 587 pages, 7 plates, 123 illustrations. Revista Cubana de Oftalmologia, Havana, 1922.

Two years ago we welcomed Elliot's work on Tropical Ophthalmology stating: "We know of no book on ophthalmology recently published in which the ophthalmologist of the western temperate zone will find so much of interest and profitable entertainment." A better acquaintance with it has given increased respect for it, as revealing important phases of ophthalmology new to the literature. This translation makes it directly accessible to the workers in Spanish speaking countries, some which occupy such a large part of the region lying within and adjoining the tropics in both hemispheres.

The pages are almost exactly the same size as those of the English edition. The increase (of 48) in their number is due to three things. An introduction to the Spanish edition, of 18 pages, has been written by the late Juan Santos Fernandez. He speaks of Elliot's book as a gem, and compares the field of practice in India with that of Cuba; with the relative frequency, relationship and course of parasitic and other diseases in the two countries. The second increase in pages is made in the chapter describing onchocercosis, which has been doubled in length. Here, too, are introduced the four added illustrations, taken

from the writings of Pacheco Luna, already familiar to readers of this JOURNAL. (see v. 2, p. 793.)

A third cause of the difference in the number of pages is the impossibility of fully translating the condensed English of Col. Elliot into Spanish idioms, without increasing somewhat the number of words used. The translation, so far as we can judge it, is accurate, complete and smoothly worded; nothing has been omitted or abstracted. It is quite worthy of the original English and that is high commendation. It is a cause for congratulation in all respects, that we have this piece of literature in common, a new bond between Spanish speaking and English speaking peoples.

E. J.

The very complete book on Tropical Ophthalmology by Colonel Elliot in the English language came out in 1920, and was recommended to our readers in a previous review. Dr. Francisco Fernandez has translated this into Spanish; and J. Santos Fernandez has added numerous observations applicable to our southern states, to countries of the Caribbean, and to South America. He describes the original book as a "happy addition to the ophthalmologic literature of the English language." Elliot is a veteran in scientific ophthalmology, having practiced for many years in the tropical climate of India, and is a judge in all that pertains to the subject, having had a colossal experience in a territory of over three millions of inhabitants in this semifabulous country.

The climate and the density of its population is different from that of the white and temperate countries of Europe and America, but it likewise contains a number of English immigrants, who do not give up the habits of their race. In consequence of this they, as well as the natives, are liable to acquire certain affections peculiar to the tropics. The Mestizos or Eurasians, usually having European fathers and Asiatic mothers, ape the European habits, wearing hats and European clothes, and in addition to

this have all the ignorance and negligence of the natives. India has both a tropical and a temperate climate, depending on its location in the plains or mountains. This is somewhat similar to the climate of Cuba. The results of the heat and the intense light, climate, habits and parasitology, cause many eye affections. Elliot has enriched the subject of tropical ophthalmology by full descriptions. His experience is 600,000 cases.

In Cuba, following the war of 1895, from the establishment of the brutal reconcentration there followed many cases of poor alimentation. A contagious conjunctivitis was present called *ceguera*, carried about by a little fly. There were also an immense number of serious cases caused by bathing the eye with human urine of a gonorrheic character. The lice, the chiggers, and sand fleas also carried the disease. Elliot refers most interestingly to the superstition and the charlatanism of the inhabitants. This is likewise the case in Cuba, where many of the inhabitants are very ignorant and fanatical. In India there are great numbers of glaucomas and cataracts. This likewise obtains in Cuba despite its much smaller population. Every once in a while Fernandez does a dozen cataract operations in a day. Trachoma is not prevalent, as a large part of the inhabitants are negroes or negroid, and these are not susceptible; however, ulcers of the cornea are quite frequent. The instillation of remedies of charlatans in the eyes is similar to that of India where *yerba buena cimannora*, the blood of bedbugs, and other odd remedies are used. The careless handling of explosives gives rise to many accidents in Cuba.

The effect of the intense light causes hyperesthesia of the retina and conjunctivitis from reflection, the latter somewhat similar to the effect of poison war gases. It is one of the causes of cataract. Fernandez has seen a number of cases of injuries to the eye from lightning, and especially from looking at eclipses of the sun, similar to that of India. Hemeralopia,

called by Elliot 'nyctalopia,' is comparatively often seen, especially in cases of retinitis pigmentosa. Before the freedom of Cuba, it was a frequent cause of rejection from service in the Spanish troops. It is supposed to have relation to the alimentation in some cases in Cuba. Hemeralopia has been seen among cultivators of tobacco.

Infections caused by insects are common in tropical countries, where the insects find a veritable Eden compared to that of India. Small and large flies, the fleas, lice, chiggers, mosquitoes all abound, and even a peculiar eye fly which causes the "*ceguera*" and a catarrhal conjunctivitis. The bats even contribute to eye disease, as they are thick in the sky at night dropping their ordure on the head, and into the eyes of anyone who might look up. The poisonous plants, as the *Euphorbia ferox*, from their pollen cause eye affections. Even a butterfly is capable of causing lesions in the eye from its handling. Infection of the eyelashes and the eyebrows by lice is common among the peons, and the drinking of strong spirits also causes diseased conditions, there being frequent cases of delirium tremens and optic atrophy from alcohol poisoning.

The two books, both the one in English and this one in Spanish offer a rich compendium of practice and an arsenal of ophthalmologic remedies for clinical use in tropical climates. Occasionally, even as far north as the reviewer is located, some of these tropical affections are met with, as there are very many newcomers from tropical climates; so a study of these books is decidedly illuminating and helpful in practice.

H. V. W.

**Jahresbericht ueber die gesamte Ophthalmologie.** Herausgegeben von Prof. O. Kuffler, Berlin. Bericht ueber das Jahr, 1920. Berlin, Julius Springer, 1922.

This volume put out as a successor to the Nagel-Michel "Jahrsbericht" is numbered 47 of the series which was suspended during the war. As the



editor points out in his prefatory note, it is really a supplement to the *Zentralblatt für die gesamte Ophthalmologie und ihre Grenzgebiete*, which is also edited by Prof. Kuffler and published in parts every two weeks. To some who have thought of the "Nagel's Jahresbericht" as a complete reference library, this volume, which has been announced as its successor, will prove a disappointment.

However, taken in connection with the monthly publication it represents, it furnishes a very complete work of reference. The "Zentralblatt" is issued in two volumes a year, 13 or 14 parts in a volume. These volumes begin in February and August. Each volume is furnished with its index of authors and subject and is complete in itself. It is made up of abstracts intended to cover all important articles in the literature, and to these abstracts the reader of the "Jahresbericht" is referred by number indicating the volume and page of the "Zentralblatt" on which the abstract is to be found. In this volume the bulk of references are volumes 3 and 4 of the *Zentralblatt*. But some few are to volume 5 and a very few to volume 6; because, altho the papers were published in 1920, they had not been received until later. Thru the "Jahresbericht" the literature for the calendar year 1920 is thus segregated and the key to it is furnished by this volume.

Then, too, all the literature of the year relating to one topic is brought under one heading and can be found, indicated in a single list instead of requiring a search thru 26 different parts of the "Zentralblatt" to secure all these references. Under such heading are given in full the titles to all the papers touching upon it with references to the places of original publication and the volume and page of the "Zentralblatt" in which an abstract is to be found. In connection with some of these headings is given a brief critical review touching the salient points of the literature. The lists of papers correspond rather closely with the bibliographies at the heads of sections

of the *Ophthalmic Year Book*, or *Ophthalmic Literature*. The critical review might be compared with the "Digest of the Literature," which takes up the greater part of each section. But the relative lengths of the two parts are very different; in the "Jahresbericht" the bibliographies occupy 200 pages, and the critical review only 175 pages. Of the 284 topics under which the titles of papers are arranged; only 38 are accorded any critical review. These reviews are prepared by 22 collaborators.

Because of differences in the time covered and in the arrangement of subjects, it is almost impossible to compare this volume exactly with *Ophthalmic Literature* so as to ascertain which contains the larger series of references. A careful checking up of a small part of the volume seemed to show that they are almost exactly equal, altho each had a number of references that the other had not. A comparison of name indexes showed a larger number of authors noticed in the "Jahresbericht," as might be expected in the two years time occupied in completing the list.

The book is well printed and the references seem accurate. About one-fifth of these are taken from American journals. There are no illustrations. For the student who wishes to trace out all that has been written on a subject this work constitutes a positive addition to the literature of *Ophthalmology*.  
E. J.

**The Nature of Glaucoma** (Das Wesen des Glaukomes) by **Otto Wernicke**, published by Oscar B. Mengen, Buenos Aires, Argentine, 1922.

This essay of 163 pages deals exhaustively with the theory of Wernicke that glaucoma is not a purely ocular disease, but one of the results of disseminated or tuberculous sclerosis of the nervous system; the latter due to arthritismus or rheumatism, and this being the result of spirochetes. We well know that syphilis and disseminated sclerosis go together, and that syphilis may rest in the system for

years or decades without symptoms. He considers that certain congenital and anatomic defects, and those due to intrauterine disease are backgrounds of the local affection. Myopia, glaucoma and keratoconus are associated with defects of development, diseases or interference with the secretions of the endocrin glands, and to sclerotic processes in the nerves.

He divides glaucoma into the following conditions: (1) Simple glaucoma of the nerves. The cause is in the neuroglia or the papilla, affecting the nerve and then the retina. (2) Simple uveal glaucoma. The cause is in the uveal portion of the papilla and goes into the uvea. (3) Simple scleral glaucoma. The cause is in the scleral portion of the papilla or rises in the sclera. (4) Glaucoma with hypertension. This originates in the anterior portion of the choroid. This form can arise alone, but often is combined with the other three forms.

In the short words of Graefe, "Glaucoma is a picture of a slow exchange of bodily fluids and a vascular torpidity connected with the arthritic condition." Glaucoma is a clinical congeries of symptoms composed of two principal conditions. The first is a simple glaucoma, which follows arthritic disease of the posterior portion, particularly evinced in the lamina cribrosa. The second is the increase of intraocular pressure, which is an indirect result of arthritic disease in the ciliary portion of the uvea. Glaucoma is, therefore, an arthritic affection due to general disease causing changes in the intraocular nutrition. He believes that glaucoma is always associated with retrobulbar neuritis, which sometimes shows in the papilla, and that many cases of simple optic atrophy are the results of this condition and have the same causes as glaucoma.

The book is a mass of theory unsubstantiated by direct clinical evidence and does not, so far as I can find out (as it is extremely hard to read), give any thought to the original focal infections which in the last few years at least are believed to be the causes

of most of the rheumatic and arthritic diseases.  
H. V. W

**American Ophthalmological Society, Transactions** of the 58th Annual Meeting. Washington, D. C., 1922. Octavo, 367 pages, 17 plates and 32 figures in the text. Published by the Society. T. B. Holloway, Secretary. Philadelphia, 1922.

This volume records the proceedings of the largest of the longest series of annual meetings of any ophthalmologic society in the world. The German society was founded before the American, but last year held only its forty-third meeting. At this meeting in Washington, the week following the International Congress, the American Ophthalmological Society registered an attendance of 97 of its 178 active members and 87 guests. Of the latter, 13 came from abroad and 9 took part in the proceedings. Papers by Morax, Magitot and Clegg were read, while Collins, Gallemaerts, Mackay, Rochat and Rowan took part in the discussions. Then there were four papers read that had been prepared for the International Congress, but excluded from its program, because some of the papers offered had to be declined and these were by Americans who could present them at this meeting.

The titles of all papers included in the volume will be found under their appropriate headings in Current Literature. There are 37 of them, and they compare well for interest with those of any similar volume of transactions. This may be classed thus: Dealing with the anatomy and physiology of the eyes 3, anomalies 1, instruments and operative procedures 9, therapeutics 2, prophylaxis 2, educational 2 and clinical 19. For interest they compare well with those recorded in other volumes of transactions of this and other societies. Two of the plates are in colors, the others in black and white half tones. All are well executed and add to the scientific value of the volume, and the same is true of the illustrations scattered thru the text.  
E. J.

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**Pacific Coast Oto-Ophthalmological Society.** Transactions of the Tenth Annual Meeting. Salt Lake City, 1922. Octavo, 116 pages, 11 plates, 17 figures in the text. Published by the Society, Salt Lake City, 1922.

This society was organized at San Francisco in April, 1906. The second day of its meeting came the great earthquake and fire to scatter those who had gathered for its sessions; and altho one meeting was held in Seattle in 1909, it was not until 1914 that its series of annual meetings was begun at Portland, Oregon, July 1-3. These were continued regularly thru the world war and since. Its active membership has grown now to 219. This is not a national society, but its membership is drawn from a territory larger than that of Great Britain and Ireland, France, Germany, Spain, Italy, Belgium, Netherlands, Denmark, Sweden and Norway combined, and having a population of over 8,000,000. It is to be fairly compared with the national societies; and the aggressive spirit of its members that sustain this annual publication makes it worthy of more than passing attention.

About one half the volume is given to papers and discussions relating to ophthalmology. One of the plates gives the fundus appearances by red free light. A series of cases, by Dr. R. A. Fenton, of Portland, giving the results after orbital and ocular battle injuries, includes a diagram of each case showing the exact location of the wound, and also its extent and character. It is better to have these transactions in small crowded type than not to have them at all. But they are worthy of better form, and in such form would appear to less of a disadvantage when compared with the volumes issued by other societies.

E. J.

**The Practical Medicine Series, Volume III, The Eye, Ear, Nose and Throat.** Edited by Casey A. Wood, Charles P. Small, Albert H. Andrews, George E. Shambaugh, Series 1922, Chicago. The Year Book Pub-

lishers, 304 South Dearborn St. (See also p. 149.)

Many of the writers on special subjects were in Army Service during the World War and had little opportunity to do any literary work. As a consequence there was no increase, but rather a decrease of articles at that time. Since then, however, there has been a decided increase, and it is difficult to make a selection of the most valuable articles for a publication such as this, which gives very full abstracts of articles chosen mainly "as likely to interest the general practitioner." The specialist too will find the more practical of the numerous papers here, which have been selected for abstract and comment.

Two hundred and twelve well illustrated pages are given to the eye. Of particular moment to the ophthalmologist is the article on "Practical Perimetry" by Gradle, who prefers the Bjerrum screen perimeter and the tangent screen on the black board and speaks well of the Lloyd stereocampimeter. A number of new observations are made upon infections of the eye and upon trachoma. Homotransplantation of the cornea has apparently been successful in laboratory experiments, as shown by Ebeling and Carrel. Articles on the "Pupil in Health and Disease" by Würdemann and Foster are of import to the general practitioner. Loss of vitreous in cataract with its consequences is described by Paine, who thinks faulty technic is the main cause. Glaucoma is given considerable space. The ocular menace of wood alcohol poisoning by Ziegler, ocular manifestations in encephalitis lethargica, in influenza, sinus disease, are noted. Ocular injuries are given considerable space, especially those from war injuries. An article of particular moment is that by G. H. Cross on "Plastic Repair of the Eyelids" by pedunculated skin grafts and is freely illustrated. Ocular thereuptics receives more than usual space. The use of milk and foreign proteid injections in eye disease seems to be advancing. Massage of the eyeball, par-

ticularly for iritic adhesions is discussed by Würdemann.

The ear shows no particular articles of moment, except that in examination and in the descriptions of deafness. The Nose and Throat shows the usual discussion of the sinuses. The treatment of hay fever has had some advance by antigens and tuberculin. Adenoids and tonsils again make their appearance with modifications of operations and new instruments. The treatment of disorders of speech should be done in special hospitals according to J. S. Greene.

H. V. W.

**Bronchoscopy and Esophagoscopy**, by Chevalier Jackson, M.D., Professor of Laryngology, Jefferson Medical College, Professor of Bronchoscopy and Esophagoscopy, Graduate School of Medicine, University of Pennsylvania. Octavo of 346 pages with 114 illustrations and 4 color plates. Philadelphia and London: W. B. Saunders Company, 1922.

This book is based on an abstract of the author's larger work "Peroral Endoscopy and Laryngeal Surgery" which was published in 1914. It is

about one-fourth the size of the original volume and is intended for a working manual, whereas the former volume is in text book style. A large number of corrections, revisions and additions have brought the subject up to date.

This volume contains one new chapter on "Acute Stenosis of the Larynx." Chapters to be found in the old volume are omitted in the new (1) suspension Laryngoscopy, (2) External Laryngeal Surgery, (3) Intubation Dilatation of Chronic Laryngeal Stenosis, (4) Laryngostomy, (5) Malignant Disease of the Larynx, (6) Technic of Thyrotomy for Malignant Disease of Larynx, (7) Technic of Laryngectomy.

As in all his publications, the author attempts to give by photographs, drawings, and word pictures, a clear conception of difficult mechanical problems. As is well known, most of Dr. Jackson's actual working procedures are original, and therefore the subject matter of his publications is to be found nowhere else in the literature. Needless to say this volume will be studied by all those interested in this special field.

H. V. W.

## ABSTRACTS

**Kidd, Leonard J.** The fourth cranial nerve, *British Jo. Ophth.* v. vi, No. 2, 1922, p. 49.

In this contribution the author shows: (1) That the decussation of the fourth nerve is not quite complete; in short, that it contains a few uncrossed fibers; (2) that the sixth nerve nucleus gives origin to uncrossed fibers exclusively, all of which pass out in the homolateral sixth nerve; and (3) that the mesencephalic trigeminal root is not motor, and cannot therefore form the visceral motor component of the fourth cranial nerve.

The author further discusses the embryologic, anatomic, pathologic and experimental evidence, as observed by himself and the views offered by other investigators, regarding the origin, crossing or uncrossed fibers and func-

tion of the nerve supply to the extrinsic muscles of the eye ball. He concludes that the fourth cranial nerve has only two out of the four fundamental nerve components of a segmental nerve, viz.: (1) Somatic motor, and (2) Somatic afferent.

A lesion strictly limited to the cells of one fourth nucleus will give almost complete paralysis of the contralateral superior oblique muscle, together with a very slight paresis of the homolateral superior oblique. Ignorance of the fact that the fourth nerve contains some direct fibers can lead to error in diagnosis. A pure sixth nuclear lesion gives homolateral signs alone, whereas a pure trochlear or oculomotor nuclear lesion of necessity gives bilateral palsies or paresis. The vast majority of cases of ocular palsies are due to fas-



cicular, radicular, or radiculonuclear lesions, and only a small minority to purely nuclear lesions.

In considering the meaning of direct trochlear and crossed oculomotor fibers, the fundamental error has been made of comparing the fourth nerve with the third nerve. The true comparison is between the fourth nerve and the branch of the third nerve which supplies the inferior oblique muscle. It should be remembered that, whereas the fourth nerve supplies only one muscle, the third nerve supplies four eye muscles, and a large oculopalpebral muscle, the levator palpebrae superioris.

D. F. H.

**Gainsborough, H. and Gainsborough, R.** Quinin Amblyopia, *British Journal of Ophth.*, 1922, v. 6, p. 259.

This history is interesting in that within a few hours after ingestion of 60 grains of quinin the patient was just able to distinguish light. All the characteristic fundi changes were present. There was no deafness or tinnitus. About twenty-four hours later vision was apparently normal. Two days later the fields showed no contraction. There were no deficiencies two months later.

D. F. H.

**Birkhauser, R.** Iontophoretic treatment of corneal opacities with tube electrode. *Klin. M. f. Augenh.*, 1921, v. 67, p. 536.

Birkhauser reports 8 experiments on rabbits, and 10 cases of old corneal opacities; in which the usual therapy was without success, but the iontophoresis yielded a moderate improvement. So far as observed, the epithelial lesions and irritations of the globe are not due to iontophoresis, but to mechanical damage by the electrode cushion. A tube electrode is better, as it excludes lesions of the epithelium and chemical irritations, and brings the whole surface of the cornea in contact with a relatively large quantity of electrolytic fluid. It transports iodions thru the cornea, and thus is superior to simple diffusion. The cases of old opacities of the cornea must be selected. Diffuse opacities, without de-

formation of tissue, sliding without sharp borders into normal substance are favorable for it. In from 20 to 30 treatments with chlorid-iontophoresis, of 2 milliamperes and 2 minutes dosage, an improvement of vision can be attained.

C. Z.

**Colombo, G. L.** Influence of low tension on diffusion in the cornea. *Ann. d'Ocul.*, 1921, v. 158, p. 368.

In order to determine the reason for the favorable influence of corneal perforation on certain lesions, such as *ulcus serpens*, the author made the following experiments. A disc was removed by a trephine from the center of a rabbit's corneas, without perforation. In the cavities thus obtained, a dense emulsion of fluorescein was placed, which was thoroly washed out at the end of 30 seconds.

A paracentesis was done on one eye, and the wound reopened every 5 minutes to remove the aqueous which reformed. In this eye, the diffusion of the fluorescein from the center to the periphery invariably proceeded with a much greater rapidity than in the other eye. This was undoubtedly due to the lower intraocular tension, from which it can be concluded that such a tension favors nutrition and the advent of defensive substances in pathologic states of the cornea.

Repeated paracentesis should therefore be of value in corneal lesions of a rapid and destructive character, less so in superficial and chronic ones. The conjunctiva should be sterilized as much as possible, dacryocystitis cured, and the puncture should be made at the limbus, after a preliminary sterilization of this area by tinctur of iodine carefully applied.

C. L.

**Harald G. A. Gjessing.** Tonometry. *British Journal of Ophth.*, 1922, v. 6, p. 452.

The author has tonometrically examined 2,186 eyes, with the object of verifying Schiötz's normal limits or establishing a more nearly accurate estimate. Two groups compose the series. One group of 1,128 eyes, were in every way normal persons between the ages

of 10 to 87 1/2 years. The second group of 1,052 eyes, in persons between the ages of 15 to 80 years, had cataract of one kind or another. The tables compiled from this investigation, which are arranged in decades, should be studied by those interested.

The general average of tension, all of which were taken with the 5.5 weight, in clear lenses was 4.470, those with more or less developed cataract 4.863. The lower limit which Schiötz fixed of 6 with 5.5 cannot be kept. In young healthy people an action of 6 or 7 with 5.5 does not indicate pathologic change. In all persons examined only six normal eyes were found, where the tension was less than 3 with 5.5.

In only one of these was the pressure 2; the balance showed 2.5. The author concludes that Schiötz's upper limit of 3 with 5.5 must be kept up. He prefers recording tension as a fraction, the weight used as the numerator and the oscillation as denominator, rather than converting it into mm. of Hg. This should be international.

D. F. H.

**Oppenheimer, E. H. Treatment with afenil.** *Klin. M. f. Augenh.*, 1922, v. 68, p. 232.

Oppenheimer injected afenil into a man, aged 22, with typical spring catarh. The patient reacted with slight collapse, vertigo and pallor. Subjective and objective symptoms were not in the least relieved.

C. Z.

**Uhthoff, W. Marginal dystrophia of corneas; traumatic expulsion of lenses.** *Klin. M. f. Augenh.*, 1922, v. 68, p. 289.

A healthy man, aged 29, had been suffering for years from indolent marginal ulcers of the both corneae. By ac-

cidentally pushing his finger against the right eye, he ruptured the thinned marginal part of the cornea, and expelled the lens. After 12 years he had the same misfortune with his left eye. V. R. fingers at 3 m.; L., 1.50 m. Nothing could be found with regard to the etiology of the affection.

C. Z.

**Mellinghoff, R. Optic neuritis during lactation.** *Klin. M. f. Augenh.*, 1922, v. 68, p. 371.

Mellinghoff reports the detailed clinical history of a woman, aged 30, who suffered from optic neuritis and temporary blindness. The greatest etiologic probability was the detrimental influence in lactation from the more rapid disintegration of albumin and the formation of toxins by it. The case terminated in recovery.

C. Z.

**Rath, J. Examination of the Spinal Fluid in Eye Affections.** Goettingen Inaugural Dissertation. 1920

Since Quincke's studies of the clinical value of lumbar puncture, in 1891, considerable literature has arisen. The author gives the results in sixty-nine cases of eye disease from the clinic of Prof. Igersheimer, with the eye findings and the appearances of the spinal fluid—its clearness, pressure, Pandy and Nonne-Apelt reactions, lymphocytes, Wasserman reaction and also the Wasserman blood reaction; the latter two varying greatly. The author gives a differentiating point between choked disc from brain pressure, anomalies and local diseases; as when it is over two hundred it shows brain pressure. In most other eye cases the spinal fluid had appeared normal. He disputes the claim that in most eye diseases increase of spinal pressure is found.

H. V. W

## NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

### DEATHS

Dr. Enrique V. Agramonte, New York, aged 77, died December 4th, from myocarditis and pulmonary edema.

Dr. E. Sidler-Huguenin, professor of ophthalmology at the University of Zurich, is dead.

Dr. Henry Whitman Kilburn, Lucerne, Switzerland, died in Los Angeles, December 4, aged 65.

Dr. Walter E. Whitney, Bangor, Maine, aged 57, died November 28th, from uremia.

### PERSONALS.

Dr. A. Barkan is spending the winter in San Francisco.

Dr. L. Webster Fox spent the Christmas holidays with his son in San Francisco.

Dr. Jesse B. Stark announces the removal of his office to 270 Park Avenue, New York.

Dr. Harry V. Würdemann, Seattle, has been commissioned Lieutenant Colonel, Medical Officers' Reserve Corps, U. S. A.

Dr. Hallard Beard, son of the late Dr. Charles Beard, of Chicago, has opened offices in the Peoples Trust Building, in Dr. Leigh Schwarz' suite.

The Swedish Medical Association gave a stipend from the Pasteur fund to Prof. A. Pettersson for his research on pneumococci in corneal ulcer, and to continue his attempts to transmit leucemia from man to monkeys.

Dr. G. E. Hartshorne, president of the Tulsa County Eye, Ear, Nose and Throat Society, was appointed to the position of Superintendent of Health of Tulsa County, Oklahoma.

Dr. J. de Jesus Gonzalez of Leon, Gto. Mexico, has just completed twenty-five years of active practice in ophthalmology. He celebrated the occasion by publishing a compilation of his most important papers on neurology.

Dr. Lloyd Mills, of Los Angeles, is leaving for Spain on the 15th of February. While much of the journey is for rest and sight seeing, he is planning to see Barraquer at work under his own conditions, and other work in Madrid.

Prof. Albert Vogt, who has been at Basle, has accepted the appointment to the University Eye Clinic at Zurich, where he is to take charge in April. In September of this year, from Monday the 3rd to Saturday the 8th, he will give his second course on slit lamp microscopy. The number of participants is limited, and application must be made by June 30th to the University Eye Clinic, Ramistrasse 73, Zurich, Switzerland, accompanied by the fee for the course, seventy francs.

### SOCIETIES

The Chicago Ophthalmological Society, at its annual meeting held January 15th, elected the following officers for the ensuing year: President, Dr. Robert Von der Heydt; Vice-President, Dr. John R. Hoffman; Secretary-Treasurer, Dr. Charles P. Small; Corresponding Secretary, Dr. Clarence Loeb; Counsellor, Dr. Ralph C. Matheny, Galesburg.

At the annual meeting of the St. Louis Ophthalmic Society held on January 26, 1923, the following officers were elected for the ensuing year: President, Dr. W. H. Shoemaker; vice-president, Dr. J. W. Charles; secretary and treasurer, Dr. N. R. Donnell; editor, Dr. L. T. Post.

The annual banquet of the Minnesota Academy of Ophthalmology and Otolaryngology was given January 11, in conjunction with the clinic week of the county medical society, and all the visiting physicians attending congresses in St. Paul were invited to attend. Dr. Meyer Wiener, St. Louis, gave an address.

The Eastern New York Eye, Ear, Nose and Throat Association, made up of men interested in these specialties in Troy, Albany, Schenectady and this vicinity, has been formed that mutual interchange of subjects pertaining to these specialties might be made. Meetings are held the third Wednesday of each month alternately in the different cities. The following are the officers in charge for the year: President, Dr. E. E. Hinman, Albany, N. Y.; Vice-President, Dr. J. J. O'Brien, Schenectady, N. Y.; Secretary and Treasurer, Dr. F. M. Sulzman, Troy, N. Y.

At the annual meeting of the Virginia Society of Oto-Laryngology and Ophthalmology held recently in Norfolk, the follow-

ing officers were elected for the ensuing year: President, Dr. Elbyrne G. Gill, Roanoke; vice-president, Dr. Joseph A. White, Richmond; and secretary-treasurer, Dr. Emanuel U. Wallerstein, Richmond. Hereafter, meetings will be held once a year. The next is scheduled for April, 1923, at Richmond.

At the International Congress of Ophthalmology, held in Washington in 1922, the invitation of the ophthalmologic societies of Great Britain and Ireland to hold the next congress in London in 1925 was accepted. A general committee consisting of representatives of the inviting societies has since met and has formed an executive committee, empowered to make arrangements for the 1925 congress. It will be held in London July 21-24. The three official languages will be English, French and German. The subscription for membership has been fixed at the sum of £2 (\$9.30). Invitations will be sent to the principal ophthalmologic societies or other representative bodies in every nation, asking them each to nominate a delegate to the congress who would be responsible for promoting its interests in the country which he represents. Leslie Paton, F.R.C.S., 29 Harley Street, London, W., is the secretary.

## MISCELLANEOUS

The Boston Eye and Ear Infirmary and the Massachusetts Association for Promoting Interests of Adult Blind each receive \$10,000 by the will of the late Arthur F. Estabrook.

The Massachusetts School for the Blind, situated at Watertown, and the Massachusetts Charitable Eye and Ear Infirmary of Boston, each receive \$75,000 from the estate of the late Charles G. Green of Cambridge.

Federal and state health officials of Minnesota are uniting in conducting a trachoma survey among the Indian and white population in the northern section of the state. Trachoma, which is prevalent among the Indians on White Earth Reservation, it is feared may spread to the whites.

Construction work on the new ten-story building for the Chicago Eye, Ear, Nose and Throat College and Hospital will be started in April, 1923. It will be located on the northeast corner of Market and Randolph Streets. The first floor will be leased and the second and third floors will be for clinic and operating rooms. The upper seven floors will contain private rooms for patients. The estimated cost of the structure is \$400,000.



## Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type**. The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

### BOOKS.

- Fisher, W. A.** Ophthalmoscopy, retinoscopy and refraction. Chicago, W. A. Fisher, 1922. A. J. O., 1923, v. 6, p. 60.  
**Mellish, M. H.** Writing of medical papers. W. B. Saunders, Philadelphia, 1922. A. J. O., 1923, v. 6, p. 61.  
 Transactions of An International Congress of Ophthalmology, Washington, 1922. Luther C. Peter, Sec. A. J. O., 1923, v. 6, p. 61.

### DIAGNOSIS.

- Amoretti, E.** Microscopy of living eye. Rev. de la Asoc. Med. Argentina, 1922, v. 35, p. 385.  
**Bielschowsky.** Anomalies of position and movements of eyes, pupil reactions, visual field, central and psychic disturbances. 102 pp. G. Theime, Leipzig, 1922.  
**Graubart, A. L.** Threshold vision and Fechner's law applied to static retinoscopy. Arch. of Optom., 1923, v. 2, pp. 30-37.  
**Green, A. S., and L. D.** Ophthalmoscopy by red free light. (1 col. pl.) A. J. O., 1923, v. 6, pp. 16-18. Trans. Pacific Coast Oto-Ophth. Soc., 1922, pp. 40-43.  
**Jackson, E.** Focal illumination with reference to direct sunlight. (dis.) Trans. Pacific Coast Oto-Ophth. Soc., 1922, pp. 17-22.  
**Munoz Urra.** New Model of ophthalmoscope. Los Prog. de la Clin., 1922, Nov. p. 256.  
**Rasmussen, C.** Results obtained with Gullstrand lamp. Hospitalstid., 1922, p. 760.  
**Ryer, E. LeR.** Essentials of practical test chart. Arch. of Optom., 1923, v. 2, pp. 20-30.  
**Shahan, W. E.** Ophthalmic illuminator. (2 ill.) Trans. Amer. Ophth. Soc., 1922, pp. 245-250.  
**Vega de la, E.** Microscopy of living eye. (19 ill.) Semana Med., 1922, v. 29, p. 1193-1207.

### THERAPEUTICS.

- Blaxland, F. J.** Mydriasis due to uncommon drug. Med. Jour. Australia, 1922, Nov. 18, p. 599.  
**Curdy, R. J.** Action of miotic drugs on diseased intraocular structures. (bibl.) A. J. O., 1923, v. 6, pp. 22-25.  
**Macht, D. I.** Chemicopharmacodynamic relationship of atropin and homatropin. (dis.) Trans. Amer. Ophth. Soc., 1922, pp. 87-90.

- Pischel, K.** Milk injections in ocular inflammations. Trans. Pacific Coast Oto-Ophth. Soc., 1922, pp. 35-38.  
**Pollock, W. B. I.** "Open" treatment in eye operations. Brit. Med. Jour., 1922, Dec. 30, p. 1262.  
**Schanz, F.** Light therapy. Klin. Woch., 1922, v. 1, pp. 2568-2571.  
**Steindorff, K.** Local application of drugs in ophthalmology. Deut. med. Woch., 1922, v. 48, p. 1419.

### OPERATIONS.

- Report of committee on local anesthesia. Sec. on Ophth., A. M. A., 1922, p. 330.  
**PHYSIOLOGIC OPTICS.**  
**Ames, A. J., and Proctor, C. A.** Aberrations of eye. Amer. Jour. Phys. Optics, 1923, Jan., pp. 3-38.  
**Atkinson, T. G.** Einstein and optics. Amer. Jour. Phys. Optics, 1923, Jan., pp. 45-49.  
**Barrie, T. S.** Monocular and binocular vision. Brit. Med. Jour., 1922, Dec. 30, p. 1260.  
**Sheard, C.** Spheric and chromatic aberrations of lens. Amer. Jour. Phys. Optics, 1923, Jan., pp. 55-59.  
 Dominant or sighting eye. Amer. Jour. Phys. Optics, 1923, Jan., pp. 49-56.  
**Wantz, J. B.** Principles of stereovision. Jour. Radiol., 1923, v. 4, p. 9.  
 Repeated title. **Bard**, (A. J. O., 1922, v. 5, p. 988), Intern. Med. and Surg. Survey, 1922, v. 4, (8a-601).

### REFRACTION.

- Argañaraz, R.** Progressive myopia and endocrin disturbances. Semana Med., 1922, v. 29, pp. 1161-1163.  
**Berens, C., Jr.** Accommodation rule with new features. (2 ill.) A. J. O., 1923, v. 6, pp. 26-28.  
**Briggs, H. H.** Importance of heterophoria tests in routine refraction. Sec. on Ophth., A. M. A., 1922, p. 268-281.  
**Crampton, G. S.** Pocket retinoscope. (1 ill.) Trans. Amer. Ophth. Soc., 1922, p. 251.  
 Tilting trial frame. (1 ill.) Trans. Amer. Ophth. Soc., 1922, p. 252.  
**Duane, A.** Monocular and binocular accommodation. (6 ill. dis.) Trans. Amer. Ophth. Soc., 1922, pp. 132-157.  
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- Repeated title. *Odin.* (*A. J. O.*, 1923, v. 6, p. 74). *Intern. Med. and Surg. Survey*, 1922, v. 4, (8a-499).
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- Wilkinson, O. Present day status of squint surgery. (10 ill. dis.) *Sec. on Ophth.*, *A. M. A.*, 1922, p. 310-326.
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